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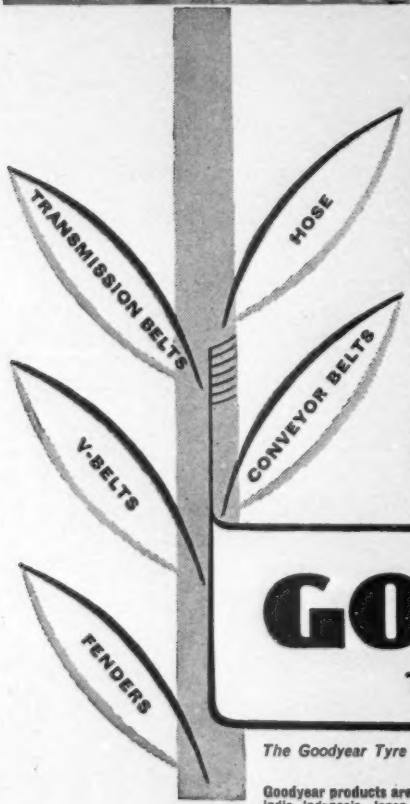

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IRON AND COAL
TRADES REVIEW

Vol. 180 June 10, 1960 No. 4,795

Coal Link-up With Europe?

WITH the prospect of a link-up by the United Kingdom with the European Coal and Steel Community in the air — the Government is studying the idea of offering to join ECSC and Euratom—it is of great interest to visualize what effect such a step might have on the British coal industry. Difficulties could be expected, naturally, but they might well be of far less frightening proportions than those which faced the Six when they first created their three different European Communities.

Mr. John Raven, director of the British Coal Exporters' Federation, who examines the prospects of such a tie-up, in an article published in "The Guardian" (May 31), firmly believes that membership of the Community would bring benefits to the British coal industry, as well as to Western Europe, which, fundamentally, needs British coal —"a little less now perhaps than it did from 1945-55, but a lot less than it will need it once we are through the present period of comparative coal surplus in Europe." We live in an age where the growth of energy requirements is attaining almost geometric progression. At the moment, every colliery organization in Europe is trying to reduce production and stocks to equate supply with demand. Never in the history of the European coal industry, Mr. Raven points out, has such equilibrium been possible. "The industry will lumber on past the point of balance into a comparative seller's market." At this point consumers will begin to stock up and to jockey for favourable future treatment in supplies. Miners everywhere will sense the change in atmosphere. Rising productivity may be offset by shorter working time and wage increase demands will be stimulated. Shipowners will be watching, and if British, American, and Polish coal is once again under pressure from a resurgence of demand in Europe, calculations about the levels at which ships can be operated economically will be passed over in favour of market freight rates, much to the discomfiture of a Continent which on the experience of a mere three years has "lulled itself into a sense of perpetual fuel plenty." Here, Mr. Raven declares, will be all the ingredients of another coal shortage —though probably quite temporary—and at a lower level of production than that of 1955.

It is unlikely that the oil industry would resist the temptation to raise its prices. It may have to again before long as a matter of expediency, anyway. It is not practicable for large sections of European coal consumption to move over at short notice to oil firing, nor can atomic energy swing into a powerful rhythm of production in a matter of two or three years. Says Mr. Raven: "In such a situation, access to British coal would be a massive benefit to Europe, for the linking of our own coal resources with those of France, Germany, and Belgium would be an insurance against recurrent extremes of shortage and surplus. It is much easier for fuel production and movements to be co-ordinated within a unit of 400,000,000 tons a year than in one of half that size." The National Coal Board is an example of this. It has undergone a period of difficulty with only a fraction of the hardship of the 1930s.

Our geographical position makes our coalfields a European economic asset, in the absence of national restriction, and belonging as much to certain sectors of the West European coastline as to some of our inland industrial centres. We also have the lowest pit-production costs of any West European country, and restrictions placed on the import of our coals into community countries are a serious dislocation of their national fuel economies. France bans British coals at the moment by protectionist controls, focused because of ECSC commitments on "third country" coals. On a free market, says Mr. Raven, these coals could flow cheaply in any quantities to the whole extensive coastline area west of a line from Le Havre to the Spanish Mediterranean frontier, an area which is comparatively undeveloped because it has no flexible source of cheap fuel. They could prevent an increasing economic unbalance inside France. Western Germany, with expanding thermal electricity coal requirements, which has been drawing enormous tonnages from America on long-term contracts since Britain withdrew from the European coal trade in 1955-56, could resume her traditional source of supply for the North-West German coast. Under present controls we are allowed to export only 300,000 tons to Western Germany this year. Above that insignificant quota we would have to pay a prohibitive import duty. Similarly, there are compelling reasons why Belgium, handicapped by high-cost coal, and Holland, free so far from restriction of the import of British coal, but probably apprehensive about an extension to her of the ECSC's protective principles, should welcome the British coal industry into the Community.

Mr. Raven believes that the primary benefit to

Britain of her membership of the Community would be increased stability of trading throughout the cycle of shortage and surplus. In times of shortage our available supplies would be spread over a marginally wider range of outlets. The Community countries, which undeniably had to make some moderate sacrifices at first, are today benefiting from mutual co-operation in more assured outlets for their own coals. "A new formula for bringing British coal back into the forefront of Western European economic co-operation could extend these fundamental benefits of continuity and stability far into Europe's fuel-hungry future," says Mr. Raven. Undoubtedly the possibilities of linking up with the Western European coal-producing countries involve some deep thinking for the National Coal Board and the Government. The problems are complex. Has the time not come, however, for us to realise, that even in coal trading, we cannot for ever stand alone?

How Much Steel?

SUBJECT as it must be to a wide margin of error, the estimate of the United Nations Economic Commission for Europe that world steel production will be doubled in the next 15 years poses more problems than it solves. At all events, the commission has started off on the right foot.

There is no substitute for iron ore, and although identified reserves are believed to be fully adequate, developments are in hand to increase the rate of iron-ore production in this country from the current level of 16,700,000 tons per annum to a target figure of well over 25,000,000 tons on the completion of the third development plan. Home ore raisings are approximately equal to imports, and it is understood to be the aim of industry to preserve that balance. Expansion of the scope of ore-mining operations in Lincolnshire and Northamptonshire will be matched by the increased intake of imported ores.

Initial steps have already been taken to ensure British participation in the outputs of Sierra Leone and Liberia. The formation of a new company, the British Ore Investment Corporation, Limited, with a capital of £5,000,000 wholly subscribed by the British Iron & Steel Corporation and the seven biggest users of foreign ore, ensures a modest, but not impressive share of the present and prospective outputs from the mines in West Africa. There is not much doubt that the feverish quest for new sources of supply will compel action on the part of the British steel manufacturers to increase their foreign investments—not only in the over-sea sources of supply, but also in the expansion of the ore-carrying fleet in which the industry has invested a considerable capital sum.

The provision of adequate facilities for discharging cargoes at the ore terminals will impose further charges on the industry, whose capital resources are beginning to show signs of strain, and the conclusion is that the faith of investors in the future of steel will be fully tested in the next decade.

MR. LAWMAN WELCH, FIRST HAND STEEL MELTER AT THE SCUNTHORPE WORKS OF THE APPLEBY-FRODINGHAM STEEL COMPANY BRANCH OF THE UNITED STEEL COMPANIES, LIMITED, LEFT LONDON AIRPORT ON TUESDAY FOR THE UNITED STATES. HE IS REPRESENTING THE STEELWORKERS OF BRITAIN AT THE BRITISH EXHIBITION IN NEW YORK WHICH IS OPENED TODAY (FRIDAY) BY THE DUKE OF EDINBURGH. MR. WELCH WILL OPERATE A WORKING MODEL OF A NEW TYPE OF OXYGEN BURNING BRITISH STEEL FURNACE ON THE BRITISH IRON AND STEEL FEDERATION'S STAND. HE WILL BE THE GUEST OF THE UNITED STEEL WORKERS OF AMERICA DURING PART OF HIS STAY AND WILL LEAVE NEW YORK ON JUNE 18 FOR CANADA, WHERE HE IS TO TAKE UP A SCHOLARSHIP TO STUDY THE LATEST CANADIAN PRACTICE.

Increased Production in Austrian Steel Industry

OFFICIAL figures from Vienna show that during the first quarter of the year the Austrian iron and steel industry was working at almost full capacity. Compared with the corresponding period of 1959 output of pig-iron rose by 30.2 per cent. to 530,000 metric tons and of raw steel by 30.4 per cent. to 763,000 tons, while rolled steel products rose by 26 per cent. to 512,000 tons.

At 241,000 tons the inland sales of rolled and drawn goods rose by 28.9 per cent., while the export sales went up by 26.6 per cent. to 271,000 tons.

Steel Usage Record

20 PER CENT. MORE THAN A YEAR AGO

SLIGHT reduction in the average weekly output of steel and pig-iron in May is accounted for, states the Iron and Steel Board, partly by the effect of relining at blast furnaces and repairs at steelmaking plant carried out in the normal programme, and partly by interruptions in production at certain blast furnaces with consequent temporary difficulties at the associated steelmaking plants. Average weekly output of steel in May was 475,400 tons, compared with 478,100 tons in April and 384,600 tons in the corresponding period in 1959. Pig-iron was down to 299,100 tons, compared with 310,600 tons in April and 240,500 tons a year ago.

During the first quarter of 1960 the home usage of finished steel is estimated at 3,660,000 tons on a seasonally corrected basis—over 20 per cent. greater than in the first quarter of 1959. The result represents a gain of 5 per cent. over the previous highest figure reached during the second half of 1957.

The rise in steel usage since the latter part of 1959 is rather more than would be expected from the rise in output of the various steel consuming industries. A similar divergence has appeared in the past—in 1955 for instance—at times of rapidly increasing industrial activity. Among possible reasons for the difference is the expansion of work in progress in the engineering industries.

Rise in Steel Stocks

The provisional result of the census taken at the end of March permits the estimate of a rise in total stocks held by consumers of 172,000 tons, or 5.5 per cent.—the first increase for two years. Nevertheless, the increased rate of usage of steel was such that the number of weeks' usage in stock declined from 11.7 to 11.2 weeks during the quarter.

Stocks held by users in private industry rose by 7.2 per cent., but this was partly offset by a reduction in the tonnage held by public organizations. Among the products for which separate figures are available steel sheet stocks show the largest proportionate rise, amounting to 42,000 tons or 10 per cent., roughly parallel to the rise in the output of motor cars in the first quarter.

Figures of percentage changes over the previous year for UK finished steel consumption show how widely the pendulum has swung. In the first quarter of 1957 at 3,370,000 tons, it was 2.9 per cent. down. By the end of the year consumption had recovered to 3,460,000 tons, or 4.8 per cent. up. By the end of 1958 it had dropped steeply to 3,000,000 tons, or 13.3 per cent. down, and in another 12 months it had risen as sharply to 3,370,000 tons, an improvement of 12.3 per cent. and varying by as much as 25.6 per cent. It is now running at 3,660,000 tons, or 21.6 per cent. up on a year ago.

Consumers' stocks show considerable recovery but none are back to peak figures, which together with dates are given in parentheses. The provisional figure for March, 1960, for steel sheet is 463,000 tons (484,000 tons, March, 1958); plate, 565,000 tons (840,000 tons, June, 1958); tinplate, 134,000 tons (142,000 tons, September, 1957); other products, 2,120,000 tons (2,774,000 tons, March, 1958). Of the total of all products of 3,282,000 tons (4,220,000 tons, March, 1958), public organizations hold 439,000 tons (710,000 tons, June, 1958) and private industry 2,843,000 tons (3,516,000 tons, March, 1958). Total consumers' and merchants' stocks are provisionally put at 3,656,000 tons (4,641,000 tons, March, 1958).

Latest pig-iron and steel output figures (in tons), with the corresponding 1959 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.*	Weekly average.	Annual rate.*
1960—March ..	312,300	16,238,000	485,100	25,226,000
April ..	310,600	16,150,000	478,100	24,861,000
May ..	299,100	15,554,000	475,400	24,723,000
1959—March ..	221,200	11,501,000	362,700	18,860,000
April ..	231,300	12,027,000	387,300	20,139,000
May ..	240,500	12,504,000	384,600	19,999,000

* No allowance is made for holidays and figures for months not affected by holidays should be reduced by about 1,000,000 tons.

200 Years of British Steel

DISPLAY of the British Iron and Steel Federation at the British Exhibition in New York, which opens tomorrow (Saturday), is claimed to be the most impressive the United Kingdom steel industry has ever put before the public anywhere in the world.

More than 300 companies who make or process steel in Britain are represented in the display. The exhibits, costing £100,000, demonstrate British achievements in technical advances in steelmaking over the past 200 years, and the uses made by British skill and craftsmanship.

Among the exhibits illustrating the industry's post-war development programmes which, by 1962, will have cost £1,000,000, will be photographs showing the new steel plant now under construction at Newport in Monmouthshire, and a section showing one of the new oxygen-burning steel furnaces.

Among the leading representatives of the industry in New York for the exhibition will be the president of the British Iron and Steel Federation, Mr. R. F. Summers (chairman, John Summers & Sons, Limited); the president-elect, Mr. C. R. Wheeler (joint managing director, Guest Keen Iron & Steel Company, Limited); the independent chairman, Sir Ronald Morison; chairman of the public relations committee, Lord Dudley Gordon (chairman, Hadfields, Limited); and the commercial director, Mr. E. W. Senior.

Passing Thoughts . . .

INDUSTRY the world over is able and willing to play its part in raising the standard of living, but it cannot achieve this objective without full political support, which in its turn demands greater mutual understanding, greater trust, and ever closer working between those engaged in Government, business, and the trade union movement.—SIR NUTCOMBE HUME, chairman of the Charterhouse Investment Trust.

With a great deal of luck the Government might win through to the latter part of the year without having to turn the screw further. But the probability is that it will not have the luck.—London and Cambridge Economic Bulletin.

As a stereotype "nationalization" nowadays not only offends non-Labour electors, but it also apparently bores loyal Labour supporters. At the same time there is widespread approval of publicly-owned industries which serve the consumer well and do not delve into the taxpayer's pocket.—Conclusion of Dr. Mark Abrams' special research survey into British political attitudes.

There can be no doubt that the application of science in industry can lead to a more abundant life, always provided that science leaves us alive to enjoy it.—MR. LEWIS T. WRIGHT, *general secretary of the Amalgamated Weavers Association.*

As one who buys annually some 15 tons of solid fuel to keep home and family warm, and as a typical house-husband on the "have to do-it-yourself basis," I take a poor view of having personally to riddle, extract, and dispose of about one ton of ash each year—apart from paying for the nuisance directly and indirectly. Colliery management must continually strive to turn out the cleanest possible prepared product.—MR. W. V. SHEPPARD, director-general of reconstruction, National Coal Board.

The Coal Board's report for 1959 *is illuminating rather than warming.—Doncaster Chronicle.*

It is vital to the success of all our efforts that the sub-standard wagon of coal should never in any circumstances be allowed to leave the pit.—SIR JAMES BOWMAN, chairman of the National Coal Board.

Before the summer is out many miners will be earning more at tattie howking and turnip singling than they will be in the pits.—MR. GRAHAM STEEL, *Harthill East delegate, at the Scottish NUM conference.*

Don't try to smash strikes—they're a safety valve. If you try to suppress strikes you can easily get more violent industrial unrest or chronic apathy in the form of go-slow movements.—MR. KENNETH KNOWLES, Oxford Institute of Statistics.

Industry cannot have the skilled workers which it will need tomorrow, unless it is prepared to train them today.—MR. P. J. M. THOMAS, *Parliamentary Secretary to the Ministry of Labour.*

In this country, during the last ten years, the cost of living has gone up by 55 per cent. and the price of coal by 75 per cent. whereas the cost of electricity to the consumer has increased only 20 per cent. In relation to the cost of other commodities, electricity in Britain today costs about one half what it did before the war."—Mr. H. G. NELSON, managing director of the English Electric Company, Limited.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

To the Editor of THE IRON AND COAL TRADES REVIEW.

SIR,—I should like to thank you for the article in your May 27 issue on the Clean Air Year Book, 1960, published by my society. This was very fair even in certain criticisms that were made.

I would like, if I may, to comment on one or two of the points you discuss.

(1) You express surprise at Dr. Parker's revised estimates of the pollution from different sources, which show a greater emission of smoke from coal used for domestic purposes, despite a somewhat lower consumption. This is simply because the amount was previously under-estimated. More precise measurements carried out by the British Coal Utilisation Research Association show that the amount of smoke from a domestic coal fire is considerably higher than was previously believed, and amounts to 2½ per cent. to 5 per cent. of the coal burned.

(2) You defend the militancy of the coal trade and refer to "the opinion too widely held that the coal trade is opposed to Clean Air." Is this not to be expected in the light of some of its recent activities, which have been described by the Minister of Housing and Local Government in the House of Commons as "very undesirable," and when we find that out of 41 cases of organized opposition by the trade to proposed Smoke Control Areas, no fewer than 28 of these should be in black area towns?

(3) You quote and question our statement that "the drive for clean air is not a drive against coal." It is a drive against the uses of coal that lead to smoke production, but the NSCA has never sought to oppose the smokeless combustion of coal and has in fact been advocating this for over half a century.

For instance, in the last issues of our journal, "Smokeless Air," the principal technical papers and reports are all on the smokeless combustion of bituminous coal.

(4) We agree about the importance of the sulphur problem, which as you know has no easy solution. But the percentage of sulphur in the different fuels is far from being a complete measure of the harm done by this component. The amount of fuel that is required for any specific purpose is an important factor, as is the height from the ground level at which the gases are emitted. So far as the prevention of sulphur dioxide emission from domestic sources is concerned the main lines for improvement at present available are (*a*) to halve the consumption of solid fuel by replacement of open fires by closable stoves, and (*b*) to extend the uses of electricity (in which the gases from the power stations are emitted at a much higher level), of sulphur-free gas, and of oil other than the heaviest fuel oil. This further step forward to clean air is not, as yet, being advocated, because for various reasons it is better to concentrate on smoke prevention.

In view of the practical consequences of a policy for the prevention or reduction of sulphur dioxide emission, it is not easy to see why the coal trade should be so anxious about it.—Yours faithfully,

ARNOLD MARSH,
Director.

National Society for Clean Air,
Palace Chambers,
Bridge Street,
London, S.W.1.

June 7, 1960.

Profit and Loss

RECORD OF TWO NCB DIVISIONS

ALTHOUGH they had totally different financial reports to present, two chairmen of National Coal Board divisions expressed optimism in the future of the industry last week. Mr. W. H. Sales, chairman of the North-Eastern Division, was able to report a record profit of £13,440,000 and said that everyone in the Yorkshire coalfield could look forward with confidence to the future, provided goodwill and co-operation were maintained. Mr. R. W. Parker, chairman of the Scottish Division, had to report a loss of some £13,000,000, but he too looks to the future with confidence.

In contrast to its financial success, the Yorkshire coalfield had the worst strike and absenteeism record of all the divisions. Mr. Sales stated that reconstruction and reorganization were going ahead steadily and would improve the results already obtained.

MR. W. H. SALES

He warned, however, that 1960 would differ in some respects from last year. Miners would be working for a target tonnage (to be fixed later) so as a build-up to the 44,500,000 to 46,500,000 tons expected in 1965. "Target tonnage," he said, "involves a balancing of many factors and the criterion of success will consequently be affected."

Record Productivity

The coalfield's dispute and absenteeism record was responsible for 43 per cent. of the national loss of coal through these causes and, in all, totalled 417,000 tons. Absenteeism at 17.77 per cent. compared with the national average of 14.69 per cent. Even so the record was an improvement on 1958 when the coalfield was responsible for 45.7 per cent. of the national loss and absenteeism ran at 17.4 per cent., compared with the national figure of 14.14 per cent.

Another Yorkshire record was in productivity. Output per manshift rose to 29.82 cwt., the 1958 record being beaten by 5.4 per cent. Manpower during the year decreased by 7,882 by normal wastage and at the year end was 127,562. Manpower estimated to be required in 1965 is between 123,000 and 129,000.

Each Area in the division made a profit—Worksop, £2,565,233; Doncaster, £1,387,598; Rotherham, £3,436,026; Carlton £456,585; South Barnsley, £880,529; North Barnsley, £2,246,056; Wakefield, £84,750; Castleford, £2,885,215.

Reporting that Scotland's deficit represented a loss of 14s. 2d. on every ton brought to the surface, Mr. Parker stated that in spite of the gloomy figures, he felt confident that there was a big future for the industry and that it was vitally necessary for the well-being of the country.

There were three or four reasons for the Scottish losses. It was hit in 1959—in common with other parts of the country—by the cost of stocking. More peculiar to Scotland was the fact that it was operating a large number of pits which were either under reconstruction or were building up after reconstruction. It took about three to five years to build up to an economic output so that in the earlier years there was a very substantial loss.

It also had to be realized that there were still quite a number of pits in the last years of their lives. These were mostly non-profit making. He would not reveal which pits were shouldering the majority of the loss, but it could be stated that East Fife Area lost £3,000,000 last year and the Alloa Area £1,811,000.

Mining Apprentices Who Quit Cause Concern

IT was disconcerting to find many young lads leaving the industry both before and after completing their apprenticeship, said Mr. W. C. Wilkinson, production manager, No. 3 (Northern Northumberland) Area of the Northern (N&C) Divisional Coal Board. Speaking at a presentation of apprenticeship completion certificates to 26 young craftsmen at Ashington, arranged jointly by the Coal Board and the Northumberland Colliery Mechanics' Association, he said: "While 30 per cent. of present output in the Area is by power loading, the time is coming when it will increase to 65 or 70 per cent. Therefore, it is not only necessary to have men to work the machines, but to have them maintained by craftsmen such as you."

Mr. Tom Holliday, president of the Northumberland Area of the NUM, said that lads completing their apprenticeship should not be left "in the air" but given continued encouragement.

Presenting the awards, Mr. N. Watson, Area chief engineer, said that in view of the increasing complexity of mine equipment it was imperative that craftsmen should carry on with their studies. There was every facility in the new Ashington Mining and Technical College.

LARGE SCALE production of gold-bonded germanium diodes is to be undertaken by M.C.P. Electronics, Limited, a company formed under the joint management of Mining & Chemical Products, Limited, and the semi-conductor division of Compagnie Française Thomson-Houston. The latter company manufactures transistors, diodes, and rectifiers while Mining & Chemical Products specializes in refining rare metals and is the leading producer of semi-conducting materials.

Obituary

MR. ROBERT CRAWFORD

FORMER planning engineer for the Fife and Clackmannan Area of the Scottish Divisional Coal Board, Mr. Robert Crawford has died at the age of 81. He retired in 1950 after 59 years in the industry. His varied career began as a 12-year-old pony driver at Burghlee Colliery (Midlothian) and after winning a county bursary he was awarded a diploma at Heriot-Watt College, Edinburgh, and was only 22 when he obtained his first class colliery manager's certificate.

Appointed planning agent for the Fife Coal Company, Limited, in 1932, he later travelled all over Britain and in many parts of Europe studying methods of mine engineering. During the war he worked for the Ministry of Fuel and Power and became group production director and assistant regional production director, respectively. Mr. Crawford was a former vice-president of the Mining Institute of Scotland and a member of the council of the Scottish branch of the National Association of Colliery Managers. His son is also a mining engineer.

MR. DAVID BRUCE

THE death has occurred of Mr. David Bruce, former managing director of British Polar Engines, Limited, Glasgow, at the age of 65. Mr. Bruce served his apprenticeship with Vickers-Armstrongs, Limited, Barrow-in-Furness, and worked in the drawing office of Cammell Laird & Company, Limited, before joining British Polar Engines as chief draughtsman in 1928.

He later became managing director and held the post for many years until 1959, when he resigned to become deputy chairman of Associated British Engineering, Limited, the parent body of the group of companies of which British Polar Engines is a member. He retired in April this year and relinquished his deputy-chairmanship to become technical consultant to the group's Scottish companies.

Mr. CLARENCE J. C. WINFIELD, founder and a director of Winfield Bros. (Birmingham), Limited, makers of metal smallwares, has died at the age of 73.

Mr. ERNEST PALMER, who died on Wednesday of last week, had been with Hudswell, Clarke & Company, Limited, engineers, of Hunslet, Leeds, for 20 years.

Mr. DANIEL MCINERNEY, who has died at the age of 91, was the largest importer of coal in County Clare, Eire. He was a founder member of the Clarecastle Harbour Board of which he was chairman for 30 years.

The death has occurred of Mr. ALFRED EDWARD DIPPLE, chairman and managing director of A. E. & T. Dipple, Limited, sheet metal manufacturers, of Nailsworth (Glos). Mr. Dipple, who was 57, founded the company in 1946.

Sir MAURICE BONHAM-CARTER, chairman of Megator Pumps & Condensers, Limited, and a director of a number of other companies, has died aged 79. He was a director of Blackburn & General Aircraft, Limited, from 1950 to 1957, and in 1948, as a partner in Falk & Partners, bankers, backed the development of Sir Frank Whittle's jet engine.

Dr. GODFREY HERBERT FRANCIS, a petrologist on the staff of the British Natural History Museum, has died from a fall of rock in the Lake District. He was 32. He joined the staff of the museum's Department of Mineralogy in 1953, became a senior scientific officer, and took part in scientific expeditions to Peru in 1954 and 1959, and also to Greenland.

Mr. JOHN THOMSON, former manager of the Glasgow branch of D. F. Wishart & Company, Limited, iron and steel stockholders, wholesale tool factors, etc., of Edinburgh, has died aged 62. He served with the Wishart organisation for about 25 years and pioneered the opening of the Glasgow branch in 1946. He was a former director of Third Lanark Football Club.

Mr. THOMAS MYLES, a pioneer and expert in stonemine driving, has died aged 81. Up to his retirement in 1957, after 67 years in the coal industry, he supervised the driving of new mines. In sinking the shaft at Manor-Powis Colliery, Bannockburn, in 1920, he created a record by cutting through 48 ft. of clay in eight days. He also set up mine driving records at Valleyfield, Blairhall and Comrie. He was made a MBE for his work in the industry.

Recent Wills

BARLOW, RUSSELL, for many years an official at the Moss Hall and Maypole collieries, Wigan ... £1,626

PEEL, J. W., former mining engineer and for many years associated with Ingham's Thornhill Collieries, Limited £38,340

EDWARDS, JAMES, from 1938 to 1950 president of the Yorkshire Area of the National Association of Colliery Overmen, Deputies, and Shotfirers ... £464

BUCKLEY, JAMES, director and works manager of Thomas Robinson & Son, Limited, woodworking and flour provender milling engineers, of Rochdale £31,940

KIRBY, J. H., managing director of the Manchester Dry Docks Company, Limited, and formerly general manager of Smith's Dock Company, Limited £20,713

MCLAUGHLAN, CAMERON, South African colliery shaft-sinking expert who helped to set up a British record at Parkside Colliery (Lancs) last year (estate in England) £720

ELY, M. V., chairman of Foster Transformers, Limited, and Foster Electrical Supplies, Limited, and a former director of the parent company, Lancashire Dynamo Holdings, Limited ... £82,956

INTESTATE

DENTITH, J. A., assistant purchasing officer for the North-Eastern Divisional Coal Board and, prior to nationalization, in the purchasing department of Amalgamated Denaby Collieries, Limited ... £4,742

Sharp Drop in Whessoe's Profits

GROUP net profit of Whessoe, Limited, designers and builders of capital plant for the oil, atomic power, gas, and chemical industries, of Darlington, fell from £629,338 to £440,130 in the year to March 31, 1960. These lower profits, the directors explain, result from the completion of fewer contracts on which profit is brought into the accounts. The effect of the lower price levels obtaining during the latter part of the year will be felt in future years, they add.

The profit includes £40,000 which is a proportion of profit accrued on a long term contract of exceptional size which has not yet been completed. Apart from this, the practice of taking no profit on work in progress has been maintained. The trading profit is down from £1,229,338 to £990,130, but the unchanged final dividend of 22½ per cent. maintains 27½ per cent. for the year.

SCOW's £4,000,000 Project

TO MEET DEMAND FOR COLD-REDUCED SILICON STEEL

TO enable the Newport Division of the Steel Company of Wales, Limited, to meet the increasing demands of the electrical industry for high-grade cold reduced silicon steels, additional plant is to be installed at Orb Works. The estimated cost of the extension is £4,000,000 and it is part of a further development scheme designed to increase output of electrical sheet steel by some 45,000 tons per annum. It is expected that the new plant will come into operation late in 1961 and early in 1962.

The new scheme, the third to be carried out at Orb Works since 1955, provides for the installation of a second 48-in. cold reduction reversing mill adjacent to the existing mill. In addition the present 48-in. mill will be modified to permit the rolling of double-weight coils.

Other items of the project include additional heat treatment plant and increased insulating facilities, together with modifications to the existing processing equipment.

Sendzimir Mill to be Installed

To increase production of very thin oriented steel strip in thickness of the order of .001 in. to .004 in. a new Sendzimir mill will be installed. The product of this unit will go towards meeting the need for material for specialized applications, including electronic devices associated with aircraft, missiles, nuclear research and development, etc.

The company is one of the leading makers of the electrical steels used in the construction of dynamos, motors, transformers, generators, and smaller electrical and radio equipment, and it is estimated that over half of the sheet and strip used for such purposes comes from Orb Works.

In 1955 the Steel Company of Wales launched a £2,000,000 project for the Newport Division for the production of cold reduced silicon steel in coil form. Hardly had this plant come into operation when, in 1958, a second £2,000,000 scheme was announced to increase production. Plant installed for the second stage is now coming into operation.

Woodall-Duckham's £20,000,000 Order-book

UNEXECUTED work in hand at the beginning of 1960 by the Woodall-Duckham Construction Company, Limited, engineers and contractors to the steel, coal, and gas industries, of London, S.W.3, amounted to £20,000,000. Value of orders placed in 1959 was £14,000,000, against £10,000,000 in 1958 and the value of work carried out was £12,000,000, compared with £14,500,000.

Announcing this, the chairman, Mr. T. C. Finlayson, said that competition was extremely keen and profit margins were narrower than for many years past. To meet that challenge new processes, methods, and techniques were being explored.

Group profits fell from the exceptionally high level of £1,617,185, to £968,594, but the dividend is maintained at an effective 25 per cent.

South Durham's New Steel Plant

FIRST battery of 26 coke-ovens which will form the coke and gas making section of the £50,000,000 South Works of the South Durham Steel & Iron Company, Limited, West Hartlepool, was formally lit by the chairman of the company, Mr. B. Chetwynd Talbot.

Stating that the mills at the South Works would begin producing in August or September, Mr. Talbot said that the works had been acknowledged by US experts, as the most up-to-date in the world. Work on the plant was six to 12 months ahead of schedule. Metal for the mills would come from the nearby North Works until the South Works furnaces are producing.

Eventually capacity would be in the region of 1,000,000 tons of steel plate per year with provision for further capacity for steel strip if necessary. A scheme was being considered for steel strip but it would be a number of years before such production could start.

The coke-oven battery, the first section of the works to come into operation, was built by Gibbons Bros., Limited, Dudley (Worcs).

Carron Company's Offer to British Motors

OFFER has been made to the British Motor Corporation, Limited, by the Carron Company, iron-founders and engineers, of Falkirk, to lay down a new foundry for the production of castings for the tractors and other motor vehicles to be made at Bathgate. The foundry would be built adjoining Carron's present factory and would cost about £2,000,000. No decision has yet been taken by BMC on the proposition.

This offer follows the announcement last week that the company had received what is believed to be the largest single contract in its 200 years' existence. Over a period of about two years it is to supply 15,000 tons of castings for the second Clyde tunnel between Linthouse and Whiteinch. A company official said that no increases in the labour force would be required, but the contract was a very important one. The price was not disclosed.

THE 10-YEAR-OLD Shell tanker Gyrotoma has been converted to ship liquid propane gas in large high-pressure steel containers as well as normal cargoes.

Board Changes

W. P. BUTTERFIELD, LIMITED—Mr. A. H. Thompson has resigned from the board.

CHARLES ROBERTS & COMPANY, LIMITED—Mr. S. A. A. Knott has resigned from the board.

D. NAPIER & SON, LIMITED—Air Vice-Marshal Sir Conrad Collier has retired from the board.

MAPPIN & WEBB, LIMITED—Mr. J. J. Astaire and Mr. C. Burkeman have retired from the board.

RFD COMPANY, LIMITED—Mr. H. F. Spencer has resigned from the board because of the pressure of other duties.

KEITH BLACKMAN, LIMITED—Mr. A. H. Woodley has joined the board in place of Mr. G. S. Teggin, who has retired.

LINE EQUIPMENT, LIMITED—Mr. A. V. Williams has joined the board of the company which is a subsidiary of Bowthorpe Holdings, Limited.

LANCASHIRE DYNAMO HOLDINGS, LIMITED—Mr. Raymond V. Ely has resigned from the board of the company and of the subsidiaries, Foster Transformers, Limited, and Foster Electrical Supplies, Limited.

J. P. HALL & SONS, LIMITED—Ald. George C. Hall, who has been associated with the company since 1898, is to retire as managing director. He will take up the new post of president with Mr. W. G. Howson as managing director.

BTR INDUSTRIES, LIMITED—Owing to the pressure of his other business interests Sir Graham Hayman has relinquished the chairmanship but retains his seat on the board. Sir Walter Worboys has been elected chairman of the company.

FIRTH CLEVELAND STEEL STRIP, LIMITED—Mr. K. A. Smith has joined the board as production director. Mr. D. R. Moylan, contracts manager, and Mr. C. D. Gladwin, chief inspector and metallurgist, have been appointed executive directors.

BRITISH BELTING & ASBESTOS, LIMITED—Mr. P. H. A. Mount, Mr. D. M. Pearson, sales manager and works manager, respectively, of the Mintex Division, Mr. J. H. Fenton, personnel manager, and Mr. C. M. Fenton, asbestos division works manager, have been appointed to the board.

SULZER BROS. (LONDON), LIMITED—On his retirement as managing director of the company and of the subsidiary, Hathorn, Davey & Company, Limited, Mr. R. M. Atkinson has been appointed chairman of each company. Mr. E. H. Stagg, Mr. G. W. Heslett, and Mr. M. W. Zublin have been appointed joint managing directors of the two companies.

SHIP CARBON COMPANY OF GREAT BRITAIN, LIMITED—Mr. H. I. Matthey has joined the board and has been appointed chairman in succession to Mr. A. L. Stock who has resigned. Mr. R. S. Silman has been appointed managing director in place of Mr. J. S. Woods who has relinquished the post and Mr. A. W. Edward and Mr. I. W. Smith have joined the board.

SUTCLIFFE HYDRAULICS, LIMITED—Mr. E. J. Wilson and Mr. A. H. Holmes have been appointed directors. Mr. Wilson joined the parent company, Richard Sutcliffe, Limited, mining machinery and mechanical handling equipment manufacturers, of Horbury, near Wakefield (Yorks), in 1951 and was London Area manager until he was appointed head of the engineering department in 1954. He was appointed general manager of Sutcliffe Hydraulics a year ago. Mr. Holmes is chief accountant of Richard Sutcliffe.

SAFE DRIVING awards were presented to 19 drivers last week at the two factories of Firth-Vickers Stainless Steels, Limited, Sheffield.

Distributed Coal Stocks Rise Slightly

THERE was another small but welcome rise in distributed coal stocks in the week ended May 28, relieving the pressure of output some 600,000 tons above consumption for the same period. Undistributed stocks are now up to 33,754,000 tons, compared with 25,440,000 tons a year ago.

There were 605,600 wage-earners on colliery books on May 28, against 665,500 on May 30, 1959, the numbers engaged at the coal face being 231,400 and 258,600 respectively. Total absenteeism (all workers) in the week ended May 28 was 13.38 per cent. compared with 12.95 per cent. in the week ended May 30, 1959. Output at the face was 3.958 tons and overall 1.405 in the week ended May 28, compared with 3.719 and 1.345 tons in the week ended May 30.

The following table gives (in tons) the output of saleable mined coal by division in the week ended June 4, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended June 4, 1960.		Week ended June 6, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	355,800	7,700	386,600
Northern (N&C)	243,900	100	270,700
Durham	459,800	200	483,200
North-Eastern ..	805,700	8,400	875,900
North-Western ..	266,100	700	296,300
East Midlands ..	870,300	—	918,400
West Midlands ..	277,100	400	322,900
South-Western ..	389,300	5,300	433,000
South-Eastern ..	30,900	—	33,000
Great Britain—			
Deep-mined coal..	3,698,900	22,800	4,020,000
Other deep-mined (including licensed mines) ..	44,300	—	57,000
Open-cast coal ..	163,300	—	234,800
TOTAL ..	3,906,500	22,800	4,311,800

Miners Spot the "Mistakes" in Colliery Safety Week

MINERS at Astley Green Colliery, near Manchester, took their families on Saturday to see the "worst coal face" the pit has ever had. The face, built on the surface as part of an exhibition in the colliery's safety week, was a full-size replica of one below. A roadway, with a conveyor belt, rails, and pit tubs, led to a coal face completely fitted up.

But everything was "wrong." Dummy miners were trapped, either because they had been handling the equipment carelessly or because it had been left unsafe. During the week the miners had toured the face and noted the number of "deliberate mistakes." The one who spotted the largest number received a £5 prize.

The pit's 2,400 miners showed so much interest they asked if their families could be shown round. So the pit surface was thrown open on Saturday.

Another small exhibition showed safety equipment damaged after being misused, and the latest safety equipment available.

Too Much Coke

LEADS TO CLOSING OF GRASSMOOR OVENS

GRASSMOOR coke-oven plant, near Chesterfield (Derbyshire), which has been producing 2,500 tons a week of the smokeless fuel "Warmco," is to be closed at the end of June because of "continuing difficulties throughout the country in disposing of the present output of coke and the high level of stockpiling." This was announced last Friday by the East Midlands Divisional Coal Board at a meeting of the Plant Consultative Committee, attended by NCB and union representatives.

The production of "Warmco," which was pioneered at Grassmoor, has been transferred to nearby Hardwick coke ovens whose output, together with adequate stocks at Grassmoor, is expected to be sufficient to meet the demand. Grassmoor's existing contracts to supply gas to the East Midlands Gas Board will be taken over by the Avenue coking plant.

"There is likely to be no redundancy among the 190 employed at Grassmoor," the NCB states. "Most of them can be absorbed at Coal Board establishments locally, particularly at the Avenue and Hardwick plants."

Had Grassmoor continued in operation, one of the four batteries of ovens would have had to be replaced immediately and the others would have required renewal during the next few years. Coke has been produced at Grassmoor for well over 60 years. At the turn of the century it was produced in beehive ovens, but the plant has been altered several times since then.

South Wales Colliery Schemes

A NEW drift, 2,000 yds. long, is being driven into a hillside to give a new lease of life to an old colliery—Cwmgwrach, in the Vale of Neath. The tunnel, a major engineering project, will enable anthracite to be delivered to a new coal preparation plant at the nearby Aberpergwm Colliery. An existing shaft, higher up the hillside at Cwmgwrach, is being deepened to improve the colliery's ventilation system.

The South-Western Divisional Coal Board has approved in principle an expenditure of about £1,000,000 on reorganization at Cwmgwrach where 460 men are employed.

At Ystrad Mynach, the South Wales branch of the Institution of Mechanical Engineers inspected the £3,000,000 reconstruction work being carried out at Ogilvie Colliery, Deri, near Bargoed. At a luncheon given to the branch by the South-Western Divisional Coal Board, Mr. George Tomkins, general manager of the Rhymney Valley Area, said that the project was one of many vast schemes which were being undertaken or had been completed by the NCB in the division. In the Rhymney Area alone it was hoped to increase output by 1,000,000 tons.

The Ogilvie scheme is intended to realize 30,000,000 tons of coal and available reserves assure the colliery a life of more than 50 years.

ECSC Coal Stocks Continue to Rise

PITHEAD coal stocks in the European Coal and Steel Community in April continued the rising trend in evidence since the end of February. Provisional figures published by the High Authority of the ECSC show stocks of 31,920,000 metric tons, compared with 31,315,000 tons a month earlier and 30,368,000 tons at the end of February. Stocks at the end of April, 1959, were 30,210,000 tons.

The bulk of the March-April increase occurred in France, where end-April stocks, at 12,276,000 tons, were easily the largest in the community. In Germany and Belgium, stocks have been relatively stable since the beginning of the year.

Stocks of coke at coking plants, in contrast to pithead coal stocks, have continued to fall, and by the end of April were down to 7,424,000 tons, from 7,775,000 tons at the end of March and 8,569,000 tons at the beginning of the year. At the end of April last year stocks were 7,700,000 tons.

Short-time working was substantial in March and April and was equivalent to a reduction in coal output of 1,020,000 tons and 872,000 tons respectively, compared with 496,000 tons in January and 482,000 tons in February. The average number of days lost through short-time working during April ranged from 0.12 in the Ruhr to 4.09 in the South Belgian coalfield. During the first four months of the year, the number of days lost ranged from 0.26 in the Ruhr to 14.22 in south Belgium.

Stocks of coal held by major consumers have been declining, and at the end of February (the latest date for which figures are available) stood at 15,990,000 tons, against 16,867,000 tons at the end of 1959, and 19,080,000 tons at the end of February last year.

Trade Balance Likely to Improve

IMPROVED trend in British trade is forecast in the May review of the National Institute of Economic and Social Research. The rise in imports is likely to slow down more than the rise in exports and the balance of surplus payments for the second half of 1960 will probably be up on the second half of 1959.

The review maintains it is too early to conclude that the upward trend in exports has been checked. Oversea orders on hand in the engineering and electrical industries, which together account for nearly half total exports, rose by 8 per cent. between December and February.

Non-ferrous Metals

Copper Prices Recover

SHARP fall in the price of copper in London following the settlement of the strikes in Chile and the expressed views that there might well be a surplus of copper in the last half of this year was abruptly reversed last week. This was mainly due to a speech by Mr. Harry Oppenheimer, chairman of the Anglo-American Corporation of South Africa, Limited, who said that should there be a surplus of copper production in the second half of this year, the leading copper producers would take appropriate action to reduce production to realistic levels. The fact that the supply/demand situation was under control reversed the downward trend and prices recovered some of their previous week's losses.

In the US custom smelters are still experiencing slow trading conditions at 33 cents a pound while producers report satisfactory demand at the same price. Offerings of scrap, on a price basis of 24 cents a pound for No. 2 wire, have been fairly heavy and this presages a cut in the custom smelter price.

Tin in London is an uneventful market, but Singapore is strong with New York steady, the price being not far short of $1.01 cents a pound. Demand from the the Continent is also better. Last week the Indonesian Government announced that it was to send its concentrates to Malaya for smelting and this is said to be the reason for the improved demand from America which has now to come into the market for its metal.

Zinc in London is still irregular with prices slightly lower. In the US the market is quiet. Zinc consumption in March last was slightly below February's level in spite of which stocks fell by a small amount to 136,600 tons at the end of March. The price is unchanged at 13 cents a pound.

Lead in London is also slightly irregular due to arrival of foreign supplies, but demand and consumption on both sides of the Atlantic is satisfactory. Indeed, in the US consumption in March was 7 per cent. up on the previous month and stocks fell below 100,000 tons for the first time for over two years. The US price is unchanged at 12 cents a pound. Official metal prices in London yesterday (Thursday) were:—Copper, Standard: Prompt £245, forward £241. Tin, Standard: Prompt £790, forward £790. Lead: Prompt £74, forward £74 10s. Zinc: Prompt £89 17s. 6d., forward £90 2s. 6d.

Increase in Ship Prices Likely

PRICES of ships from British yards were now as cheap as could be expected, said Mr. E. J. Hunter, chairman of Swan, Hunter & Wigham Richardson, Limited, on Wednesday. Modernization programmes carried through by the yard had justified themselves in more efficient production and had assisted in the lowering of prices, but, said Mr. Hunter, it was not to be anticipated that the prices of new ships would fall below what they were today.

"Rather, with the cost of components and materials tending to rise, along with the cost of wages, throughout the world, the reverse is more likely to be the case," he continued. Although the rate of ordering for ships had increased in recent months, there were still not enough orders to provide continuity of employment for all British yards.

New Legislation for Scrap Metal Merchanting

GOVERNMENT willingness to support a Private Member's Bill to reform scrap metal merchanting—action for which the trade has been pressing strongly for some years—was indicated by Mr. F. J. Erroll, Minister of State, Board of Trade, on Wednesday. Mr. Errol was speaking at the annual luncheon in London of the National Association of Non-ferrous Scrap Metal Merchants. He gave no hint as to when the Bill might be introduced.

The Minister regretted that pressure upon the Government's own legislative programme precluded a Ministerial Bill, but pointed out that a Private Member's legislation would serve the same purpose. He hinted that a sponsor in the House of Lords had been found.

At its annual meeting, the association installed its new president, Mr. H. G. Shields, director of E. Chalmers & Company, Limited, metal and scrap merchants, of Edinburgh, E. H. McConnell (Metals), Limited, and Jebb Bros. (Glasgow), Limited. Mr. M. N. Joseph was elected honorary treasurer, Mr. A. G. Robinson, director of Charles A. Robinson & Company (Greenwich), Limited, vice-president, and Mr. H. Foley, J. Norton & Son (Metals), Limited, and Mr. T. B. Henderson, director of Brandeis Goldschmidt & Company, Limited, members of the council.

Sharp Rise in Ambrose Shardlow's Profits

HIGH level of production was maintained during the latter half of the financial year by Ambrose Shardlow & Company, Limited, the Sheffield manufacturers of dropforgings and crankshafts. Group net profits for the year ended March 31, 1960, rose from £245,201 to £416,306, after tax of £365,554 (£211,531). Following the higher 5 (4½) per cent. interim dividend the final dividend is raised to 15 per cent. compared with 10½ per cent. for the previous year.

Because of the difficulty in obtaining sufficient quantities of home-produced steel the company had to buy supplies from abroad during the year, with a consequent increase in production costs. Provided the supply can be assured, it hopes to continue production at a satisfactory level during the current year. A one-for-two scrip issue is proposed for holders registered on June 24. The issue is subject to the approval of an extra-ordinary meeting and the board emphasizes that future dividends will not necessarily be increased because of the capitalization.

RECORD SALES BY METAL BOX

TOTAL sales of the Metal Box Company, Limited, London, W.1, were again a record for the year to March 31, 1960, and the company is raising its dividend from the equivalent of 8¾ per cent. to 12 per cent., with a final of 8 per cent. A further scrip issue, on a one-for-10 basis, is proposed.

Group net profit attributable to the company rose from £3,520,000 to £4,002,000. It is proposed to increase the authorized capital to £30,000,000. The scrip issue, involving £1,976,828 of capitalization reserve, will be made to holders registered on June 18.

The 1960 conference of the National Association of Colliery Managers, held at Southport last week under the presidency of Mr. H. E. Tyson, was devoted to an examination of the NCB's "Revised Plan for Coal." The technical and economic implications of the plan were discussed, its manpower and social consequences analyzed, its financial aspects explained, and its marketing needs appraised.

THREE members of the National Coal Board—Mr. H. E. Collins, Mr. J. Crawford, and Mr. R. H. E. Thomas—presented papers to the conference, and Sir James Bowman, chairman of the board, gave the closing address. A fifth member of the board, Mr. H. W. Hembry, was prevented by illness from attending. He was to have discussed some of the financial problems of the coal-mining industry, a task undertaken in his absence by Mr. A. W. John, the NCB's director-general of finance. Other aspects of the revised plan were examined by Mr. H. E. Longden, director-general of production, and Mr. W. V. Sheppard, director-general of reconstruction.

"The Challenge of Change"

Theme of this 1960 conference of the NACM was "The Challenge of Change." It was made clear in the NCB's "Plan for Coal," issued in 1950, that it was not a blueprint for the future, but would be subject to continuous review. In fact, it was revised in 1955, at a time when there was a great shortage of fuel. The results of this revision were published in "Investing in Coal" early in 1956. It was then envisaged that the country would need at least 240,000,000 tons of coal by 1965, and it was thought that this could only be got by a labour force of about 672,000 men and with the help of 10,000,000 tons of open-cast production. Not long afterwards conditions began to change.

Between 1956 and 1958, the total consumption of coal fell by 20,000,000 tons, and last year it became evident that the time had arrived for a review of the prospects of the industry. This review was undertaken by the National Coal Board and the results published in the "Revised Plan for Coal." It is intended to carry on the reconstruction of the the industry which was begun soon after nationalization. The board expects to have 80 per cent. of total output coming from modernized capacity in 1965. It does not envisage a severe contraction of the industry; it is planning to meet a demand of about the same size as now, but to meet it with more efficient and economic production.

This is the "Challenge of Change" which the coal industry of Great Britain is now facing. British coal consumption decreased by another 13,000,000 tons in 1959. In addition, consumers' and pipeline stocks fell by 5,000,000 tons. The board has reduced deep-mined coal production, closed a number of collieries, reduced the labour force, and cut open-cast output.

Higher Efficiency

Despite the difficulties, the industry made more rapid advances in operational efficiency in 1959 than in any other year since nationalization.

Productivity was at record levels and the improvements of 6 per cent. in faceworkers' output a man-shift during the year, and of 5·3 per cent. overall, were the biggest increases recorded for more than than 30 years. This improvement in productivity was largely responsible for a fall in production costs of about 1s. 9d. a ton compared with 1958, although the burden of overheads was higher because of reduced outputs. Progress of this kind means that when output is more nearly related to demand, the industry will be in a much stronger economic position.

The aim of the "Revised Plan for Coal" is to get the industry into that stronger position as quickly as possible. A sustained effort by all sections of the industry is needed to meet the challenge, and if none of that effort is to be wasted there must be a clear understanding of what the aims are, what they involve, and the part everyone is expected to play. It was for this reason that the Council of the NACM decided that this year's annual conference should be devoted to an examination of the revised plan—in particular the technical and economic implications of the plan.

Annual Meeting

The technical sessions of the conference took place in the ballroom of the Palace Hotel, Southport, and it was there that the members of the NACM were accorded a civic welcome on Wednesday morning by the Mayor of Southport (Councillor L. F. Spence, J.P.). The Mayor said that through several relatives he had associations with the coal-mining industry, and he knew something of its problems. The theme of the conference was well chosen, and he hoped that as a result of their deliberations in Southport colliery managers would contribute a good deal towards the solution of some at least of the problems of the industry.

The annual general meeting of the association followed.

Presenting the accounts and balance sheet for the year ended December 31, 1959, Mr. J. Whyld (hon. treasurer) said that some months ago it was thought that the subscription might have to be increased, but such a step had not after all been necessary, largely because of the increase in membership, and the council was happy to present a balance sheet which showed a surplus on the year's working. Pointing out that the legal expenses in 1959 were much less than in the previous year, the hon. treasurer said that the association was greatly privileged to have the services as technical adviser of Sir Andrew Bryan, whose wide knowledge of mining conditions were available to every member.

Mr. Whyld formally proposed the adoption of the accounts and balance sheet, which were approved by the meeting.

Report of Council

The hon. secretary (Mr. F. H. Harley) read the report of the General Council for the year 1959-60.

Membership of the association had continued to increase throughout the year, and the total now approached 3,000, the report stated. The council had met on six occasions since the last annual general meeing.

During the 12 months, the council and its Safety and Policy Committee had under consideration reports on incidents at several collieries, and greatly regretted the loss of so many valuable lives. The subject of the presidential address to the 1960 conference, it felt, was both appropriate and timely.

In addition to the inquiry into the Walton Colliery explosion, the council had had under consideration incidents at Bickershaw Colliery, the subject of a recent report by HM Inspector, St. John's Colliery, and the fire at Auchengeich Colliery. Two members of the association, Mr. J. McLeod and Mr. F. B. Sargent, lost their lives at Bickershaw Colliery.

The council was glad to report that the liaison arrangements with the British Association of Colliery Management had worked well, and to the satisfaction, it was believed, of both associations. The National Liaison Committee undertook the representation of both associations at the Auchengeich inquiry, and arranged for the defence of the manager and under-manager in a prosecution which unfortunately arose out of the incident at St. John's Colliery.

In the council's view, the cross-examination of witnesses at the Walton Colliery inquiry had some most unfortunate and undesirable features. The National Liaison Committee had this matter under consideration. It was pleasing to note that nothing of that nature to which exception could be taken occurred at the Auchengeich inquiry.

The association's technical adviser, Sir Andrew Bryan, represented the National Liaison Committee at the official inquiry into the Auchengeich fire. That was the first time Sir Andrew had been asked to act alone in representing the two associations at such an inquiry. He carried out a difficult task extremely well, with great credit to himself and the association, and colliery managers were extremely grateful to him.

The number of directives issued by the National Coal Board caused some concern to the council during the year, and the board's director-general of production was asked to receive a small deputation to hear the council's views. The deputation was very courteously received. Mr. Longden listened sympathetically to the deputation's representations and reassured the members of the deputation on several points.

Colliery Manager's Examinations

The council had given a lot of thought also to the future position with regard to examinations for the colliery manager's certificate, the report continued. The council was not convinced that the procedure likely to be followed would be in the best interests of the industry or of the profession of colliery management, and it resolved at its meeting on March 22 to seek interviews with the National Coal Board and the Mining Qualifications Board to obtain information and put forward its views. The matter was being pursued by the council.

The council's representatives on various organiza-

CONFERENCE PAPERS

THE papers presented at the 1960 annual conference of the National Association of Colliery Managers will be printed in full, together with the discussions which followed, in subsequent issues of "Iron and Coal."

tions formed by the National Coal Board and the Ministry of Power had continued to play their part in the deliberations of those bodies in the interests of the coal industry and the mining community as a whole. The association was represented on the Coal Industry National Consultative Council, and on the various sub-committees of that council dealing with safety and health; education, training, and welfare; and production. The council was grateful to the members who gave so freely of their time and service on these and other committees, and was especially appreciative of the work done by its representatives on the Safety and Health Committee of the CINCC, particularly in connection with new regulations.

The report of the Sub-committee on Mining Explosions, prepared under the chairmanship of Sir Andrew Bryan, had wide circulation during the year, assisted by the association. This was a subject of vital importance to the industry and on the recommendation of the council most of the branches had devoted at least one of their meetings to a discussion of it. Sir Andrew Bryan had visited several of the branches to initiate the discussions.

As members of a professional body it was incumbent upon colliery managers to learn from events, and the council had urged upon branches, and continued to urge upon them, their duty to examine carefully reports of official inquiries and other documents such as special committee reports, for the lessons they contained as guides to future conduct and procedure. Response had not been lacking.

The special position of the Indian Branch was mentioned in the last annual report. The council was glad to state that arrangements satisfactory both to headquarters and to the branch had now been made.

The council noted with pleasure the appointment during the year of Mr. John C. George, a member of the association, as Parliamentary Secretary to the Ministry of Power.

During the year new trustees of the Benevolent Fund were appointed by the council. A donation of £100 to the Coal Trade Benevolent Association was authorized.

There were no questions on the report, which was accepted by the meeting.

The hon. secretary gave details of the association's membership. He said the number of members as at May 27, 1960, was 2,966, and there were in addition 108 associate members.

Mr. H. E. Tyson then delivered his presidential address (IRON AND COAL, June 3, 1960, p. 1241).

Mr. Walter Sharpe (past-president) voiced the thanks of the members of the association to Mr. Tyson for his address. The president had ranged over a wide field of colliery managers' responsibilities and obligations. In the first place, Mr. Tyson had dealt with the formation, many years ago, of the association, to which its members were all proud to belong, and which was playing a most important role in promoting safety and efficiency in the industry.

It was clearly demonstrated by the president that the founders of the association had considerable foresight and wisdom when they laid down its primary objects, which were (*a*) the protection of the interests and the social, scientific, and intellectual position of the members, and (*b*) to watch all legislative and legal matters affecting the interests of members.

How wise and foreseeing those early pioneers were! So wise and foreseeing that those primary objects of the association had stood the test of time and also the constantly changing economic conditions for almost three quarters of a century.

Safety in the Mines

Those members who knew Mr. Tyson more or less intimately would have been surprised and disappointed if he had not made particular reference in his address to safety; and his remarks in that direction gave food for considerable thought. He had made reference also to other aspects of mining, notably to the plans envisaged in 1947 for the reconstruction of the industry and the progress which had since been made. Pits, like individuals, could not remain static—either they progressed or they deteriorated. They could not stand still; if they were to survive, they needed from time to time an infusion of new ideas or new stimulants, and in extreme cases an infusion of new blood. It was inevitable, in those cases where successful reconstruction schemes had been carried out, that the time would come when they would again need revivifying, that point in time being when the techniques now regarded as modern or indeed revolutionary had played their part, had served their day and generation, and in due time had become outworn and outmoded.

Had this not been a presidential address, which precluded any discussion, Mr. Tyson could have had a most interesting discussion on the various points he had put forward. In thanking him for an address of very high standard, Mr. Sharpe claimed a certain amount of licence in relation to the president's final paragraph, wherein it was stated: "Let us have a revised plan for safety. . . ." Mr. Sharpe suggested that the industry had got a revised plan for safety, and, indeed, Mr. Tyson had made reference to it when he had said that steps had been taken to provide better pits. Was not the modernization of pits, which was going ahead at no mean pace, essentially a plan for better collieries and, therefore, safer collieries? He would agree, however, that perhaps they had

Contributors of Papers at Last Week's NACM Conference at Southport

MR. W. V. SHEPPARD
"Introduction"

MR. H. E. COLLINS
"Natural Carbon"

MR. H. A. LONGDEN
"Implications"

reached a stage at which they should have a re-appraisal of their safety organization, that they should seriously consider some reorganization of safety personnel, and whether or not more highly trained and specially trained pit safety officers were required.

It was a great pleasure, on behalf of the conference, to extend to Mr. Tyson thanks and congratulations for an excellent and stimulating address, and to congratulate him also on the arrangements he had made for the conference.

Mr. Robert Williams (past-president) seconded the vote of thanks, which was accorded with applause.

Prize Awards

The hon. secretary read the report of the Prizes Committee, and said the council placed on record its appreciation of the committee's services. Prizes were awarded as follows:—

Futers' Gold Medal (the premier award) to Mr. C. N. Ratcliffe, of the Yorkshire Branch, for his paper, "Silverwood Colliery Reconstruction."

N. J. Muschamp Prize of £25, for his paper, "Progress of the AB Trepanner at Ormonde Colliery," to Mr. D. Marriott, of the Midland Branch.

Silver Medals to Mr. W. Clarke (Scottish Branch) for his paper, "Spontaneous Heating at Roslin Colliery," and to Mr. F. C. Thompson (South Wales Branch) for his paper on "Control of Colliery Manpower."

Bronze Medals to Mr. W. T. Elliott and to Mr. M. C. Potts, of the Midland Branch, for a joint paper, "Roofmaster Powered Support Systems," and to Mr. R. F. McCormick and Mr. F. J. Partington for a paper, "Blasting Techniques in Mines," presented jointly to the South Wales Branch.

IRON AND COAL TRADES REVIEW awards:—£10 to Mr. E. Whatmore, of the Lancashire Branch ("De-watering at Hapton Valley Colliery"). £5 to Mr. P. Thorpe, of the South Midlands Branch ("Re-opening a District at Church Gresley") and £5 to Mr. T. W. Peters, of the South Midlands Branch ("Skip Winding at Bagworth Colliery").

Election of President and Treasurer

Mr. J. S. Carson and Mr. L. R. Milligan, appointed by the meeting as scrutineers of the ballot for the election of president and treasurer for 1960-61, reported that the ballot had resulted in the unanimous election of Mr. H. H. Wilson as president and the re-election of Mr. J. Whyld as hon. treasurer.

Mr. Wilson was invited to the platform and was warmly applauded. He said that he was deeply conscious of the honour of his election, which represented the considerable degree of confidence which the members had placed in him and which he hoped to justify during his term of office. It would be his utmost endeavour to emulate the example of his predecessors, who had done so much to further the interests of the association.

Mr. Whyld, in response to Mr. Tyson's expression of congratulation to him on his re-election as treasurer, thanked the members for their renewed confidence and said that he, too, would do his best to justify it.

On the proposal of Mr. Whyld, the meeting accorded a vote of thanks to the scrutineers of the ballot.

Unwanted Ash

The technical sessions opened immediately after the annual meeting.

Mr. W. V. Sheppard, director-general of reconstruction of the National Coal Board, presented the first paper, entitled "Introduction on the Revised Plan for Coal." Stripped to its barest bones, the problem—indeed the challenge—was to extract coal from depth, to prepare it, and to distribute it so that, on level terms, coal could compete with oil, compete with the atom, compete in the export market, and provide the country with a flourishing basic industry for generations to come.

The number one task of the mining engineer was a more rapid climb in output per manshift with the least possible additional capital expenditure. Thirty hundredweights overall o.m.s. for all our pits next year, instead of, say, in 1964, would be sheer "gold," said Mr. Sheppard. Technically, he believed the facilities existed. But the coal had to be clean. Colliery management must continually strive to turn out the cleanest possible prepared product. "Never, never take the attitude of 'getting away with as much ash in the coal as possible; it helps my costs, it helps my o.m.s. figures,'" Mr. Sheppard said. So it might for a short period of time, but the damage to future market potential was far beyond such considerations.

Tunnelling Company Lunch

Following the opening session, the members were entertained to luncheon at the Palace Hotel by the Associated Tunnelling Company, Limited, and Dollery & Palmer, Limited, being welcomed on behalf of the two companies by Major J. Greenhalgh.

MR. H. H. WILSON, giving thanks on behalf of the association for the hospitality of the companies, said the occasion provided the opportunity to thank the Associated Tunnelling Company, not only for the tunnelling speeds which its equipment could give to the colliery industry, but also for the advice that was available in its excellent organization. Every member of the association knew how Dollery & Palmer had developed fast ploughing and many other forms of equipment, in association with other companies. He had had the advantage and the privilege of knowing Mr. Leobbe, who was associated with Westfalia Lunen, and there was no doubt that his death at an early age was a great loss not only to his own country, but to the mining industry throughout Europe.

Some Technical Implications

Two technical sessions were held on Wednesday afternoon, Mr. H. A. Longden, director-general of production, NCB, speaking on "The Technical and Economic Implications of the Plan," and Mr. H. E. Collins, board member for production, NCB, on "The Importance of Natural Carbon Deposits."

It would not help to indulge in wishful thinking about the likely future trends in the supply and price of oil, Mr. Longden said. It was more practical to accept that oil competition was here to stay and that coal at all costs was a policy of the past. Henceforward, their first concern must be for their competitive efficiency, and that would depend on the lowest possible costs of production and on matching quality to the customer's requirements. There could be no room for a take-it-or-leave-it attitude towards the market or for further price increases. On the contrary, they must reach the position where they could bring down prices.

Mr. Longden's paper outlined the methods the industry must adopt to produce the cheap, clean coal which was necessary to assure the future of the industry in competition with oil and other possible sources of energy. If, he said, he were asked to which single theme he attached the greatest importance, he would say: on the need to concentrate the greatest possible part of the production on really high output, high productivity, mechanized faces.

Mr. Collins's paper stressed the importance of carbon in the world today, indicating the principal sources of natural carbon, together with their estimated world reserves. It was clear, he said, that the world reserves of coal far exceeded those of oil and, to say the least, it would be very imprudent, if any regard were had for the long-term future, not to pursue further development in coal technology with the utmost vigour. Great Britain's indigenous resources for energy production, restricted as they were almost entirely to coal, made it imperative that there should be further advances in coal technology. That was essential to continued prosperity in the future and means of achieving that improvement must be sought now.

Vice-presidents

At a meeting of the General Council of the association on Wednesday evening, Mr. L. Atkinson, Mr. A. E. Hiscox, and Mr. G. Inverarity were re-elected vice-presidents. Mr. C. F. Palmer, of the Yorkshire Branch, was elected a vice-president to fill the vacancy caused by the elevation of Mr. H. H. Wilson to the presidency.

The members and their ladies attending the conference were accorded a civic reception in Southport's Floral Hall on Wednesday evening by the Mayor and Corporation of Southport. During the course of the evening silver and bronze medals and other awards were presented by Mr. H. E. Tyson.

Social Consequences

The "Manpower and Social Consequences of the Plan" were examined by Mr. J. Crawford, board member for industrial relations, NCB, at the opening technical session on Thursday morning.

Manpower was fast becoming, perhaps more than at any time in the past, the key factor in shaping the future production programme, Mr. Crawford said. There were coalfields which could safely accommodate further reductions in the numbers employed, but in most of them the margin, now, was not great. The problems of achieving a smooth decline in these places were fast being outweighed by the problems of holding and increasing manpower in the developing central coalfields. Already, large areas of the Midlands and Yorkshire were facing acute recruitment problems, and those difficulties were likely to become serious and general over the next two or three years unless the industry could stimulate recruitment and curtail the rate of wastage. They would have no assistance from outside from now on—no Government direction of labour, no national service exemptions to help. They would be fighting on their own to get and hold the men they needed and for a while at least, until they had succeeded in rebuilding that essential public confidence in the industry's future, it was going to be a difficult task. Particularly they

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MR. J. CRAWFORD
"Manpower"

MR. R. H. E. THOMAS
"Marketing"

MR. A. W. JOHN
"Finance"

had to encourage youth to join the industry—it was on them that the future depended.

Of the two factors which determined the availability of labour—recruitment into the industry and wastage from it—apart from the recruitment of juveniles from school, Mr. Crawford thought wastage was the more important. It was good to receive a new entrant, but it was worse to lose a trained miner. The loss of an experienced workman was a blow to operational efficiency and should cause a manager concern, whether his was a developing pit which would be needing that man's skills in the future, or even a pit near to closure, because those skills would normally be wanted at another pit. That factor should influence all management's thinking and attitudes. Men were the most vital component in production, whether they looked at it from a moral standpoint or from a hard-headed business angle.

Financial Problems

"Financial Problems of the Coal-mining Industry" were considered in the second technical session on Thursday morning in a paper by Mr. A. W. John, the NCB's director-general of finance. In 1947, the first year of nationalization, he said, the board incurred a loss of £23,500,000 because prices were not raised sufficiently or soon enough to overtake the costs of the five-day week and of the subsequent reintroduction of Saturday working. By the end of 1958, the accumulated loss was £32,500,000, an increase of only £9,000,000 in the next 11 years. In 1959, due to the decline in demand, and the need to stock coal extensively, the deficit increased by nearly £24,000,000. If the board had been able to sell all the coal it produced in that year it would have shown a small surplus.

The Coal Industry Nationalization Act required that the revenue of the board should not be less than sufficient for meeting all its outgoings properly chargeable to revenue account on an average of good and bad years. Between 1947 and 1958 total turnover was £8,689,000,000, and the accumulated deficit was only some 0.6 per cent. of the total. Nevertheless, there should be no deficit and it must be recovered as quickly as possible. If the selling price of coal had been only 5d. per ton higher over the years there would have been no accumulated deficiency; a little more, and the board would have had the reserves which any prudent business organization would expect to hold. Only by the narrowest of margins had the price policy and economic compulsions over the years prevented the board from building up the financial resources which today would have been so valuable in the fight to maintain markets.

Three-hosts Lunch

Luncheon on Thursday was by invitation of British Insulated Callender's Cables, Limited, Conveyancer Fork Trucks, Limited, and the Whitecross Company, Limited, at the Palace Hotel.

Mr. A. G. B. Owen, the chairman of the Owen organization, presided. As a representative of the three companies he said how happy they were to be hosts to the NACM, and he hoped the visits by the guests to the works of the three companies that afternoon, at Prescot and Warrington, would also be very happy.

In hoping the association would go on from from strength to strength, Mr. Owen said the manufacturers realized that the coal industry was passing through critical times, and he hoped that the discussions during the conference would be for the good of the industry. No-one liked to see one of the oldest industries of the country losing ground, and it was hoped that by improved methods and the co-operation of the workpeople, the miners themselves, coal would be made competitive among other forms of heat and power and would remain competitive. As the chairman of the Staffordshire County Council, he could honestly say that the people in Staffordshire were extremely keen to see the colliery industry remain in

being, and hoped that the new pit which was being opened at Rugeley, with a power station next door, would show that coal as a method of producing power was really competitive against the oil and nuclear powered stations that were being developed in other parts of the country.

Mr. Owen went on to wish Mr. H. H. Wilson, the president-elect, a happy year of office, and a happy and useful conference in Scotland next year.

Coupling with his toast to the visitors the name of Mr. H. E. Tyson, he said how happy were the hosts to be associated with a president of the NACM who came from that particular area.

Mr. H. E. Tyson, responding, said the members of the NACM were proud to have so many Lancashire machinery men with them that day, and he was very proud of the fact that they had rallied around him and had provided such excellent hospitality. Mr. Owen was associated not only with Rubery Owen, but also with Conveyancer Fork Trucks and Electro-Hydraulics. With him as hosts were Sir Rex Hodges, of British Insulated Callender's Cables, and Mr. R. S. Bleckly, who represented the Whitecross Company. Colliery managers all knew Whitecross Ropes, a very old-established firm having long associations with the mining industry.

Referring to the activities of Rubery Owen & Company, in the field of fork trucks and other mechanical devices, Mr. Tyson claimed that the North-Western Division was leading the industry in surface plant and in mechanical handling plant at the collieries. People came from all over the country to see what was being done in the division, and the president felt that a great deal of its prowess and success was due to Mr. Owen and his firm, to whom he paid due tribute.

Marketing

Thursday night was cabaret time, dinner at the Floral Hall being followed by a star-spangled programme of spectacular dancing and variety acts organized and arranged by Mr. Barrington Hooper.

It was back to serious business early on Friday morning, when Mr. R. H. E. Thomas, board member for marketing, NCB, presented a paper in which he examined the "Marketing Implications of the Revised Plan."

Any salesman must recognize that in great measure his success depended upon the price and quality of the product he sold. Only a few months ago, when speaking to the Institute of Petroleum, the Minister of Power said that his policy was "to give to consumers the fuel they want as cheaply and efficiently as possible." That was the overriding marketing implication recognized in the revision of the plan. "We know that consumers will choose the fuel they want strictly according to commercial considerations; it is the duty of us all to see that coal meets those commercial requirements, both in the kind of coal and service we offer as well as in the way we sell it," said Mr. Thomas.

At the last formal meeting of the conference, on Friday morning, following a lively discussion on the paper by Mr. R. H. E. Thomas, the chairman of the board gave the closing address (see p. 1299).

Mr. H. E. Tyson, in welcoming Sir James Bowman, said that in the last few days the conference had heard an interesting series of papers by members of the NCB on the future of the industry, and he told Sir James how grateful were the colliery managers to him for having allowed his board members to attend in order to tell the conference sincerely and truthfully how the revised plan was made and how the industry hoped to carry on in the future.

Sir James Bowman, who was given a great reception, said that as this was the last occasion on which he would have the honour to address the annual conference of the association in his capacity as chairman of the NCB, he wanted to depart a little from what had become his accepted role in summing up the subjects covered by the papers that were submitted. He wanted to speak in rather more general terms about management, about its problems in the coal industry, and the relation of those problems to the "Challenge of Change" which had been put by his colleagues.

"Inspiring" Address by Sir James

Mr. H. E. Tyson, proposing the thanks of the conference to Sir James for an inspiring and down-to-earth address, said his words were not platitudes; he knew what he was talking about, and the members would pay tribute to him for having always given the colliery manager his right and proper place in the industry. The president thought—and Sir James would know better than he did—that, generally speaking, in the mining community the relations between workmen and management had always been good until perhaps the middle years of nationalization. He thought it fair to say—and he paid tribute to Sir James—that during the time he had been chairman of the board the relationship between the management and the men had improved tremendously. During the last two years he had had a very difficult path to tread; the president recalled the tribute he himself had paid, in his presidential address, to Sir James's courage during that period, and he now added that, but for that courage, the coal-mining industry might almost have been finished. The managers were very proud that Sir James, as a mining man among mining men, had been able to do so much for the industry.

The managers would regret very much indeed that this was the last occasion on which Sir James would address their conference as chairman of the NCB. They hoped sincerely that his successor would also be a mining man who knew mining from the inside, and not just from what could be read in the press. He felt he was right in saying that they must have much more respect for and confidence in a man who knew mining from the inside than for one who came in from the outside.

Expressing the hope that this would not be the last NACM conference that Sir James would attend, the president extended to him an open invitation to attend each year as an honoured guest. The president was sure that, wherever Sir James

went when he left the board, he would be honoured, accepted, and appreciated as he had been by the association. In wishing him a happy retirement and the best of luck for the future, he hoped Sir James would look back on the years he had spent among colliery managers as among the happiest he had known in the coal-mining industry.

He proposed formally a vote of thanks to Sir James for his address.

Sir James Bowman, expressing his appreciation of the president's remarks and the friendly reception accorded him, said that at these conferences he had derived much value from the opportunities of intimate discussion with the managers. He was honoured by the invitation to join them at future conferences, and regarded it as a very great gesture indeed.

Annual Dinner

The conference ended with the association's annual dinner and dance, held in Southport's spacious Floral Hall and preceded by cocktails kindly offered by the management of the Belting Division of the Dunlop Rubber Company, Limited.

Col. G. G. H. Bolton, chairman of the North-Western Division of the National Coal Board, proposed the toast of "The Industry and the National Association of Colliery Managers." Recalling Sir James Bowman's address to the conference earlier in the day, and referring to Sir James's decision to retire early in 1961, Col. Bolton said that those working in the industry were very sad indeed to lose Sir James as their leader. But he had built up a very good scheme for the future of the industry, and, said Col. Bolton, "for goodness sake let us all follow it."

Mr. H. E. Tyson, replying, said that the members of the association had been very much encouraged during the three days of the conference by the papers presented by members of the NCB, concluding with the address that morning by Sir James Bowman on the future of the industry. The colliery managers would loyally endeavour to carry out the board's policies. The president repeated the view he had expressed in his presidential address, that but for the courage of Sir James and the board the industry might have gone down to destruction.

The president thanked the North-Western Divisional Board for the assistance given him during the last year to enable him to carry out his presidential duties. He extended his thanks also to Sir James Bowman and the NCB; and to the presidents and secretaries of the branches of the association throughout the country who had invited him to visit them and had entertained himself and Mrs. Tyson so warmly. He was very glad to have had the opportunity to visit so many of the branches.

Mr. Barrington Hooper, the chairman of Industrial Newspapers, Limited, had helped the association tremendously, as had Mr. F. H. Harley, the hon. secretary of the association, Mr. H. Cooper, and Miss Bott. His thanks were also due to the Mayor and Corporation and all the other good friends in Southport who had given their help.

Speaking of the association's membership of nearly 3,000, he said that figure included hundreds of people who must be specialists, and whose purpose was to serve the 800 colliery managers as technicians, as advisers employed by the NCB or by manufacturers of equipment, or as inspectors of mines. They were mines specialists, and the managers owed a lot to them. He believed that in future there would be more and more specialists.

Finally, Mr. Tyson expressed his appreciation particularly to the Lancashire Branch of the association, which had done so much to make the arrangements for the conference so successful; and to Col. Bolton for his kind proposal of the toast.

Mr. H. H. Wilson proposed the toast to "The Guests." The members of the association were very conscious of the deep interest which the National Coal Board had taken in their deliberations over the years, he said. He welcomed the members of the board and the divisional board chairmen and directors who were present. Many of them could be present in their own right as members, but the association was nevertheless glad of the privilege of having them as guests, particularly those from the North-Western Division, in which the conference was held.

It was very pleasing also to welcome representatives of kindred societies, the Inspectorate of Mines, and the manufacturers of mining equipment. While the manufacturers helped in a material sense, many of their staffs were members of the association, and their contribution to what was fundamentally a technical conference was greatly appreciated.

THE MAYOR OF SOUTHPORT (Councillor L. F. Spence, J.P.) responded.

At this stage Miss E. A. Futers presented the Futers' Gold Medal to this year's recipient, Mr. C. N. Ratcliffe.

The Commodore King Golf Trophy was presented by Mrs. Tyson to Mr. John Shaw, of the Scottish Branch, who had won the competition that afternoon at the Hesketh Golf Club.

Mr. W. SHARPE (past-president) proposed with great pleasure a toast to Mr. Tyson, the retiring president, on behalf of the members of the association, and thanked him for the excellent manner in which he had carried out his duties during his year of office.

It had not been an easy year, said Mr. Sharpe, for many problems had arisen, with which Mr. Tyson had dealt very successfully. The association had appreciated during the year and at the conference that behind his quiet demeanour there was a very tenancious spirit; he did not waver. He was to be congratulated, too, on his choice of venue for the conference; he had chosen very aptly, and one was sure he must feel very proud that he had had the support of the chairman and other members of the NCB. The conference had been a very great success.

Mr. Tyson, in a brief response, said he could have done nothing without the knowledge and the help of the members of the council and the hard work of the secretary. He thanked all concerned

for the confidence they had given him and hoped sincerely that he had served the association well.

He then vacated the presidential chair in favour of Mr. H. H. Wilson, who was formally invested with the presidential badge of office amid prolonged applause.

Mr. Wilson, on occupying the chair, said he was naturally very proud of this honour, which he regarded as not for him alone, but as a tribute to the members of the Scottish Branch for the contributions it had made generally to the work of the association. He repeated his promise made in thanking the members at the time of his election, that it would be his utmost endeavour to justify the confidence of the members; and he knew he had the full support of the General Council and the members of the Scottish Branch.

His first official duty, which he welcomed, was to acknowledge to Mr. Tyson the gratitude of the members for all he had done for the association during his year of office. The year, though reasonably tranquil, was not without its problems, and Mr. Tyson had worked unsparingly in the interest of the association.

That work had culminated in this excellent and opportune conference. It had been amply demonstrated by people at high level that the industry, by some concepts, might be diminishing, but it was far from dying, and those engaged in it had certainly no intention of attending the funeral. On the contrary, it still represented a major undertaking with a considerable influence on the country's economy.

The conference had given them hope and faith; and, he concluded, "Forget about the doubts of the past and concentrate on the certainties of the future."

The final formal act of the conference was the presentation by the new president of a past-president's badge to Mr. Tyson. Mr. Wilson said it would serve not only as a reminder of his year of office, but also of the fact that the association looked forward with confidence to the benefit of his continued advice, based on experience.

Ladies' Programme

Ladies accompanying members to Southport had a programme of their own specially arranged by a Lancashire Branch committee headed by Mrs. H. E. Tyson.

They accompanied their menfolk, of course, at the civic reception and the evening functions on Thursday and Friday, but there were several "ladies only" events. On Wednesday, in glorious weather, they made a tour of the Lancashire and Cheshire countryside, taking coffee at Haigh Hall, Wigan, en route to Chester, where they lunched at Rowton Hall by invitation of Gullick, Limited, Mrs. T. Pollard presiding.

On Thursday, the ladies had a choice of two tours. Some 70 toured the Ribble and Hodder valleys, taking coffee at historic Samlesbury Hall and lunching at Stirk House, Gisburn, with the Mastabar Mining Equipment Company, Limited, Mrs. M. Armstrong acting as hostess. Other parties lunched at Blundellsands, also at the invitation of the Mastabar company, Mrs. J. G. Wood presiding, and afterwards visited the factories at Aintree of W. R. Jacob & Company (Liverpool), Limited, biscuit manufacturers, Schweppes, Limited, and Eric Bemrose, Limited, colour printers, where they were given tea.

On Friday morning the ladies listened to a talk by Mr. Robert Fabian ("Fabian of the Yard"), and afterwards lunched in the Palace Hotel at the invitation of Oldham & Son, Limited, Mrs. C. D. J. Statham presiding. At the annual dinner each lady received a set of Nottingham lace dinner mats with the compliments of W. E. & F. Dobson, Limited, and a copy of Frank Singleton's "Lancashire and the Pennines" as a gift from the Underground Mines Locomotives Group of the Locomotive and Allied Manufacturers' Association of Great Britain.

Decline in Canadian Steel Production

DURING the first quarter of the year Canadian steel production reached a peak when the rate of expansion exceeded 100 per cent. of capacity for several weeks. Output reached 1,692,504 ingot tons, compared with 1,358,903 tons during the first quarter of last year. Present rates of production, however, show week-to-week changes in the range of 80 to 90 per cent. of capacity, and while producers are optimistic, they agree that the demand in the second quarter of the year was lower than in the first.

All four major producers have increased their capacity, so that output is still ahead of last year, and according to the latest official figures 107,456 tons of steel ingots were produced in the week ended May 21, which was an increase of 1.4 per cent. on the 106,012 tons last year.

A study prepared by a Montreal firm shows that Canadian consumption of steel, at about 973 lb. per capita, is second only to the US at about 1,323 lb. per capita. This gap between Canadian and American consumption is narrowing and if it were to narrow by half over the next 20 years, the study concludes, Canadian production might reasonably increase by 100-130 per cent. to between 12,000,000 and 14,000,000 tons a year.

Durgapur Lime and Dolomite Plant Commissioned

LIME and dolomite plant constructed by the Wellman Smith Owen Engineering Corporation, Limited, at the Durgapur Steelworks, West Bengal, India, has just been completed and is now in operation.

The plant consists of two vertical shaft lime kilns, each capable of producing 75 tons of burnt lime per day, fired by a mixture of blast-furnace and coke-oven gases. Burnt lime is discharged from the bottom of the kilns and transferred by vibrating feeder and conveyor belt to storage bunkers.

The dolomite burning plant consists of a horizontal kiln 275-ft. long with a diameter of 8 ft. 6 in. continuously charged with raw dolomite and iron oxide. After passing through the kiln, the burnt dolomite is discharged into a rotary cooler 65 ft. long and then crushed before transfer to storage bunkers by belt.

Wellman Smith Owen is a member company of ISCON—the British consortium building the steelworks at Durgapur.

Book Reviews

Steel Roadway Supports. By Dr. Fritz Spruth. London: Colliery Guardian Company, Limited, 30, Furnival Street, E.C.4. 251 pp. 237 illustrations. 50s.

IT is some five years since the National Coal Board and the Colliery Guardian Company, Limited, collaborated in the translation and publication of Dr. Spruth's earlier book, "Face Supports in Steel and Light Metal." So well was this received by British mining engineers that the author's recent book, "Steel Roadway Supports," has been translated into English and is now available.

Although described on the cover page as a practical handbook for mining engineers, "Face Supports in Steel and Light Metal" is, in fact, much more fundamental in treatment than this description suggests. The elementary theories of elastic and plastic behaviour of rocks and supports are treated in some detail and also the various theories developed to explain the behaviour of rocks following mineral extraction. This treatment, however, is kept as mathematically free as is compatible with an intelligent understanding of the text and the book contains a fund of practical knowledge.

What is of particular benefit is the author's logical development of the various arguments he puts forward to explain the choice of one of many possible alternatives. Quite apart from dealing with the several types of steel supports used in mines, considerable attention is given to the mechanical characteristics of the steels used. Manufacture, testing, heat treatment, recovery, and further utilization are all discussed. There is a particularly useful chapter on roof belting and the book concludes with a section devoted to costs and statistics relating to roadway supports in general.

Despite being a translation, Dr. Spruth's book reads fluently and provides a useful reference work. The provision of an index would possibly have increased the usefulness of this book so far as students are concerned, although a fairly detailed list of contents under the various chapter headings does much to remedy this omission.

Winning Coal. By Prof. John Sinclair. London: Sir Isaac Pitman & Sons, Limited, 39, Parker Street, W.C.2. 406 pp. 223 illustrations. 60s.

THIS is the seventh of a series of 10 textbooks currently being published by Sir Isaac Pitman & Sons, Limited, having as their author Prof. John Sinclair, Head of the Mining Department, University College, Cardiff. Previous titles in this series are:—"Geological Aspects of Mining"; "Coal Mining Economics"; "Water in Mines and Mine Pumps"; "Coal Mining Law"; "Environmental Conditions in Coal Mines," and "Winding and Transport in Mines." Yet to be issued are textbooks dealing with "Coal Preparation and Power Supply," "Ground Movement and Control in Collieries," and "Planning and Mechanized Drifting in Collieries."

This series of books on all aspects of coal mining has been written specifically for those who aspire to management and has been designed to meet the needs of students taking the various examinations leading to professional and academic qualifications.

In common with its predecessors, "Winning Coal" is an extremely well written and illustrated exposition of the subject matter. There are 11 chapters each followed by specimen questions designed to test the student's understanding of the preceding text. The first chapter deals—perhaps somewhat inadequately—with open-cast mining and is followed by two concise chapters treating the older handworking methods of mining. Although concise, these two sections are adequate and serve to fill in the background for the more detailed treatment of mine mechanization which follows.

Five chapters are devoted to mechanized mining, both cyclic and non-cyclic, and throughout, the author has been at pains to bring out the economic implications of large-scale mechanization schemes. Productivity rises of themselves are of no material benefit if accompanied by prohibitive costs. With the recent change in emphasis in the coal-mining industry of this country from the unnatural drive towards coal at any cost to a more normal state of affairs where economic factors require their due attention, the publication of Prof. Sinclair's book is of timely benefit. It is very much more than a comprehensive collection of data regarding mining equipment and its application on the face, in that the emphasis is on the reasoning necessary before a decision to mechanize is made, and why, once this decision has been made, the choice has fallen on any particular machine or system.

A brief résumé of recent developments in foreign coalfields provides interesting reading and "Winning Coal" also embraces such topics as horizon mining, hydraulic mining, and underground gasification. The final third of Prof. Sinclair's work is devoted to coal-mining explosives and substitutes for explosives, considerable attention being given to the various statutory rules and regulations governing the use of these.

Taken overall it is considered that "Winning Coal" is well up to the high standard set by the companion volumes in this series, and will prove of considerable benefit not only to students of coal mining, but also to those already actively engaged in the industry.

Rat Population of Drift Mines

QUESTIONNAIRE survey of 562 drift mines showed that there were more rat infestations at pits with large numbers of men, according to Dr. G. I. Twigg, whose research report on the subject (No. 185) has been published by the Safety in Mines Research Establishment, Ministry of Power, Portobello Street, Sheffield 1 (price 3s. 3d.).

The report states that the probability of infestation was also affected by the proximity of urban areas, the presence of surface buildings, the presence of horses, the type of surface sanitation, and the number of rat-concentration points in the vicinity. Field survey showed that dilapidated buildings and the piling of waste material encouraged infestation. The relation between infestations and manpower level depends largely on the connection between manpower level and the number of surface buildings which provide cover for the rats.

Attempts to trace rat movement from surface to underground, by means of radioactive tracers, were inconclusive. The growth of one rat population was studied for 30 months. Reinfestation could occur slowly by breeding after incomplete poisoning, but rapidly by reinvasion from outside, even after successful poisoning. Surface control prevented underground reinfestation throughout the period. Good surface control, including the elimination of food and cover, is essential.

BIRMINGHAM UNIVERSITY has appointed Mr. B. Cockayne to be William Gibbins Research Fellow in the department of physical metallurgy and Mr. E. N. Corlett to be senior Research Fellow in the department of engineering production.

NACM Conference

SIR JAMES BOWMAN'S ADDRESS

THE ROLE OF MANAGEMENT TODAY

IN his address last week to the annual conference of the National Association of Colliery Managers, Sir James Bowman, chairman of the National Coal Board, spoke of the role of management in the changed conditions in which the coal-mining industry finds itself today.

Addressing the members at the final session at the Palace Hotel, Southport, on Friday morning, he said that those engaged in the coal industry were constantly aware that they were faced by two sorts of problems—often conflicting in the actions they seemed to demand—in their efforts to achieve more and more efficient management. On the one hand, the special problems imposed by the inherent and traditional nature of the industry itself: the geological problems of extracting a mineral at great depths and in conditions of considerable danger; the economic problems of working a non-renewable, deteriorating asset; and the sociological problems of an industry inevitably dependent to a high degree on its labour force, in communities, often closely knit and isolated, with strong and bitter memories of the past. On the other hand, the problems thrust upon the industry by technological change, by the growth of new industries with different requirements, by changes in public taste, and above all by the competition of alternative fuels.

Perfection of Techniques

The effect of increasing competition on the technical side of the colliery manager's activities would mean an even greater emphasis on the exploitation of new techniques of mining and on developing the more efficient use of existing techniques, Sir James said. The industry could not afford to relax for a moment in the search for greater efficiency, for improved methods of working, for ways of bringing down costs. The industries producing alternative fuels, with which coal must compete, were high-investment industries, backed by huge financial resources, continually seeking to increase efficiency and reduce costs.

The colliery manager could not afford to confine himself only to the engineering problems of increasing productive efficiency. The efficiency of the pit could not these days be measured only in its output per manshift, but in its costs per ton. The manager today—and increasingly in the future—must think of himself as the supplier of certain markets; the test of his efficiency was his ability to supply a consistently satisfactory product to those markets. And the financial results of the colliery depended as much, after all, on proceeds as on costs.

Sir James Bowman could see no prospect whatever of a return to the conditions of the decade up to 1957. The difference between the actual size in 1965 of the nationalized coal industry, as in 1955 it was expected to be, and as the NCB now estimated it, would not be so very great: a reduction of between 7 per cent. and 13 per cent. if opencast was excluded. But the difference in psychological approach demanded by the situation, as it was now seen, was tremendous. The primary task was now to provide the consumer with the quality of coal he needed for his plant, properly and consistently prepared.

Quality All-important

No part of the activities of the colliery today was more important than coal preparation. It was vital to the success of all the industry's efforts that the sub-standard wagon of coal should never in any circumstances be allowed to leave the pit.

The revised pattern for the future of the industry gave rise to great and challenging problems for the manager in the field of manpower, Sir James Bowman continued. Manpower problems loomed very large in an industry where about 60 per cent. of the operating costs were wages costs. The manager must of course look at his manpower problem as a human problem—unless he saw it as such he could have no hope of solving it. He must also see it as perhaps his main financial problem.

The financial implications of the revised plan were such that control over costs would become even more crucial in the future. The objective of the plan was to put the industry on a strong competitive and financial basis. To achieve a stable industry, efficient, compact, and competitive, would demand from management a constant and detailed attention to costs.

The response had already been tremendous; every division, every pit had thrown its weight behind the drive to increase productivity. The results spoke for themselves. Outputs per manshift in

1958 went up by 2.7 per cent. compared with 1957. Last year it went up another 1¼ cwt.—over 5 per cent. And new records for productivity were being set up and broken week by week.

Those improvements had helped to achieve the remarkable result of a reduction in average operating costs per ton, despite all the factors tending to drive up costs in a period of reducing output. Last year, in fact, operating costs improved by 1s. 9d. per ton, and the industry would have been able to make a small profit, but for the cost of stocking coal and coke.

A Fine Achievement

"This is a fine achievement, and a wonderful tribute to the unhesitating response of management to the challenge of the situation," Sir James said. "No one could have asked for more. What I do now ask is that you go on with your efforts." Progress would be still more difficult from now on: there would be no easy gains in efficiency. The challenge of the future was even tougher than the challenge of the present. But he believed that challenge would inspire managers to even greater efforts.

"In the changed conditions of today I would say that one of the manager's main and most difficult tasks is to provide leadership for the men at his pit," Sir James continued. "He cannot do this in a purely negative way, with threats of dismissal or downgrading—there is no room in this industry for the bullying manager. His only sure way of earning the respect and loyalty of his men is to use at all times, and in all circumstances, the positive approach of fair dealing: he must be firm in his control of his pit, but his firmness must be tempered with reasonableness and candour."

Value of Consultation

In gaining the respect of his men, the manager had no more valuable asset than consultation—provided that he had a real understanding of its value, and a determination to make it work properly. Consultation must never be treated as a formality or used as a facade to cover decisions that had already been taken: nothing could be more destructive of the men's repect for their manager than to discover that consultation was used simply as a means of explaining the actions that had already been decided upon. True consultation—used, in the fullest sense, as a tool of management—was a tremendous asset to the manager in gaining the loyalty and co-operation of his men—and also the benefit of often priceless experience.

"See that the men know and understand the plans for the colliery, that they have the chance to suggest improvements; see that they appreciate the problems and difficulties that are the constant everyday accompaniment of the manager's life; and give them the encouragement of feeling that they have contributed to the achievements of the pit. This is the way to give your men a cause to fight for, to inspire and encourage them to join together in a completely united team."

In the past he had referred to the siuation that sometimes prevailed in the field of disputes as "waiting for one to happen, and then hurrying along to deal with it." It was always the task of management to look and think ahead—to anticipate problems and to plan to deal with their causes before they arose. Good management did not rely on being able to deal with problems when they arose—on staggering from one crisis to the next in the hope that somehow things would sort themselves out.

Every crisis that occurred was in itself a sign of failure on the part of management—a measure of management's lack of contact with, and appreciation of, what is going on at the pit. The manager who was in close touch with his men—who felt himself part of a team and was sensitive to the attitudes and feelings of the other members of the team—would always see the first indications of danger: the first small cloud on the horizon which might develop into a storm. That was why no aspect of the life of the manager was more vital than human relations. A manager must be an experienced and intelligent mining engineer and in touch with the latest technical developments; but even with those qualities, he would not be a successful manager without the ability to manage human beings.

Leadership

"I know what problems the manager has to face, and I understand and sympathize with all your difficulties, for I have shared them. And I realize that underlying all the day-to-day tasks that you all discharge so well, you are aware of questions and apprehensions about the future: Where is the industry going to? Are we holding our own with oil? Is the new plan adequate to deal with the situation? Have those at the top the vigour, the vision, and the courage to deal with the great and complex issues of the day? This again—and I realize it full well—is a question of leadership: leadership at the top, which must inspire faith and confidence throughout the industry.

"I claim—and, I believe fairly—that our actions in these recent difficult years have been clear and unambiguous, and that in carrying out our almost overwhelming tasks we have accepted and discharge our responsibility to the industry and to the country without ever giving way to the situation," Sir James said. "This industry must have strong and courageous leadership from the centre. Serious difficulties face us, but those difficulties are a challenge to bring out the best in us: they are there to be overcome, and so that we may show ourselves worthy of the responsibilities laid on us.

"The manager's life is a perpetual example of challenge. Nature is hostile; yet the manager must persevere and meet the challenge. In no other job are the virtues of patience and courage so essential.

THE 1960 AUTUMN MEETING of the Institute of Welding will be held from November 1 to 3 in London. The meeting will be devoted to the metallurgy of welding and brazing.

Preparation of Low-phosphorus Iron from Phosphoric Metal

By L. COOK, A.I.M., M.Inst.F.

In this paper, the author, who is on the staff of British Oxygen Research & Development, Limited, and who described in our July 11, 1958, issue how powder injection methods could be used for pre-refining of phosphoric pig-iron, gives the results of further similar investigations. In these, gas-borne slag-making and carbonaceous materials were used with success for the dephosphorization and recarburization, respectively, of liquid iron.

PREPARATION of low-phosphorus foundry iron from phosphoric metal is of current interest in the UK[1], and Higgins, R. I., and Billington, J. C.[2] of the British Cast Iron Research Association, have investigated two lines of approach to the problem, *viz.* (*a*) The development of a process producing a useful degree of dephosphorization without substantially reducing the carbon content of the metal; (*b*) the development of a process for efficient dephosphorization followed by recarburization.

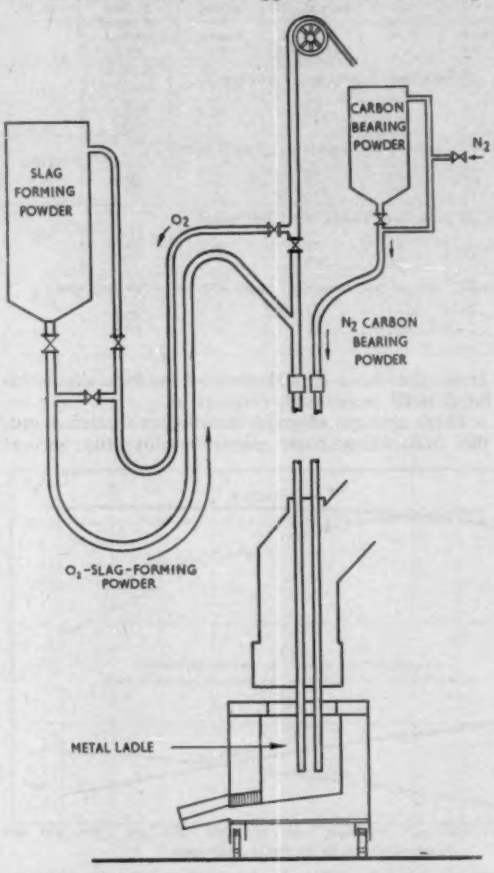

FIG. 1.—ARRANGEMENT OF LABORATORY-SCALE DISPENSING EQUIPMENT.

In the pursuit of (*a*) these workers carried out a number of small-scale experiments using a technique similar to that described by Charles, J. A., and Churcher, T. C.,[3] in which oxygen was jetted on to the surface of molten phosphoric iron and various slag-making additions were employed. An average of the BCIRA results showed a reduction of phosphorus from 1.44 per cent. down to 0.42 per cent., together with a carbon reduction from 3.27 per cent. down to 2.00 per cent.

Large-scale Trials

Large-scale trials were carried out in connection with (*b*) at Domnarvet in a 30-ton Kaldo converter with the co-operation of Prof. B. Kalling. The two examples quoted showed phosphorus reductions from 1.85 per cent. down to 0.34 per cent. and 1.71 per cent. down to 0.11 per cent., accompanied by carbon removals from 3.47 per cent. down to 1.68 per cent. and from 3.57 per cent. down to 1.38 per cent., respectively, prior to recarburization. After recarburization the metals contained 3.44 per cent. C with 0.38 per cent. P and 3.47 per cent. C with 0.14 per cent. P, some slight rephosphorization having taken place in both instances. The need for resiliconization with perhaps manganese additions was regarded as inevitable in both (*a*) and (*b*).

Previous work[4] having demonstrated the value of dispensation methods in the pretreatment of molten phosphoric pig-iron, further work carried out by British Oxygen Research & Development, Limited, also employing injected powders, has indicated that not only is a substantial degree of dephosphorization unaccompanied by a reduction of carbon content possible, but that positive increments of carbon content of the metal can also be obtained during the same operation.

TABLE 1.—*Basic Phosphoric Iron: Laboratory Tests.*

Melt No.	Metal analysis.					Slag analysis.					Metal temp. deg. C.
	Total C, per cent.	Si, per cent.	S, per cent.	P, per cent.	Mn, per cent.	SiO_2, per cent.	Total Fe, per cent.	P_2O_5, per cent.	CaO, per cent.	C, per cent.	
809	3.27	0.55	0.135	1.20	0.70	—	—	—	—	—	1,345
	3.62	0.03	0.133	0.74	0.12	14.7	15.4	—	—	—	1,450
	3.69	0.02	0.107	0.30	0.06	8.3	10.2	—	—	—	1,410
810	3.14	0.52	0.141	1.29	0.70	—	—	—	—	—	1,380
	3.70	0.07	0.127	0.90	0.10	13.0	14.2	—	—	—	1,450
	3.48	0.03	0.102	0.33	0.06	8.4	14.0	12.4	32.5	11.6	1,390
921	3.76	0.89	—	1.41	1.18	—	—	—	—	—	1,365
	4.13	—	—	1.12	—	20.6	15.3	—	—	—	1,460
	4.26	0.04	—	0.49	0.09	10.9	9.4	11.9	30.2	3.4	1,400
922	3.74	0.83	—	1.40	—	—	—	—	—	—	1,360
	4.04	—	—	1.00	—	16.1	11.2	—	34.7	—	1,440
	4.18	< 0.01	—	0.47	—	12.8	8.7	14.3	35.6	3.0	1,410

TABLE 1—(*contd.*)

Melt No.	Oxygen.		Slag-forming Materials.						Nitrogen.		Graphite.		Initial metal, wt. lb.
	Mins. at 600 cub. ft./h.	Cumulative delivery, eq. cub. ft./ton of metal (initial wt.).	Wt. of powder added in stages, lb.	Cumulative delivery of Constituents, lb./ton of metal (initial wt.). Lime.	Limestone.	Ore.	Fluorspar.	Bauxite.	Mins. at 72 cub. ft./h.	Cumulative delivery, eq. cub. ft./ton of metal (initial wt.).	Wt. of powder added in stages, lb.	Cumulative delivery, lb./ton of metal (initial wt.).	
809	(1) 11-*in dia. Basic Ladle. Lime-Ore-Spar Slag-forming Powder.* (5 *parts lime;* 5 *parts ore;* 1 *part spar.*)												
	—	—	—	—	—	—	—	—	—	—	—	—	110
	3	611	7½	69	—	69	14	—	3	73	2	41	—
	3	1,222	7½	139	—	139	28	—	3	147	2	81	—
810	(2) 11-*in. dia. Basic Ladle. Lime-Ore-Bauxite Slag-forming Powder.* (5 *parts lime;* 5 *parts ore;* 2 *parts bauxite.*)												
	—	—	—	—	—	—	—	—	—	—	—	—	110
	3	611	7½	64	—	64	—	25	3	73	2	41	—
	3	1,222	7½	127	—	127	—	51	3	147	2	81	—
921	(3) 14-*in. dia. Basic Ladle. Lime-Ore-Spar Slag-forming Powder.* (5 *parts lime;* 5 *parts ore;* 1 *part spar.*)												
	—	—	—	—	—	—	—	—	—	—	—	—	150
	4	597	10½	71	—	71	14	—	4	72	3	45	—
	4½	1,232	10½	142	—	142	28	—	4½	148	3	90	—
922	(4) 14-*in. dia. Basic Ladle. Limestone-Ore-Spar Slag-forming Powder.* (80 *per cent. limestone;* 14 *per cent. ore;* 6 *per cent. spar.*)												
	—	—	—	—	—	—	—	—	—	—	—	—	150
	4½	672	12	—	143	25	11	—	4½	81	3	45	—
	4½	1,344	6	—	215	38	16	—	4½	161	3	90	—

The dispensation method employed injected simultaneously gas-borne powdered metal slag-making and carbonaceous materials beneath the surface of the molten metal, the slag-making materials being dispensed in an oxygen stream and the carbon in a stream of nitrogen.

Laboratory-scale Experiments

The initial experiments were carried out by British Oxygen Research & Development, Morden, utilizing 110-150 lb. melts of phosphoric metal.

The apparatus, illustrated in Fig. 1, consisted of two powder dispensers each connected with the respective source of gas and with each outlet terminating in a separate lance. Each lance was of ¼ in. nominal bore mild-steel tubing which was coated with a refractory covering. The treatment of the metal was carried out in a 14-in. dia. basic-lined ladle, except in Melts 809 and 810 (Table 1) and in Melt 974 (Table 3), where an 11-in. dia. basic-lined ladle and an 8-in. dia. acid-lined ladle were used, respectively.

Three groups of experiments were carried out, the first using basic pig-iron only, the second

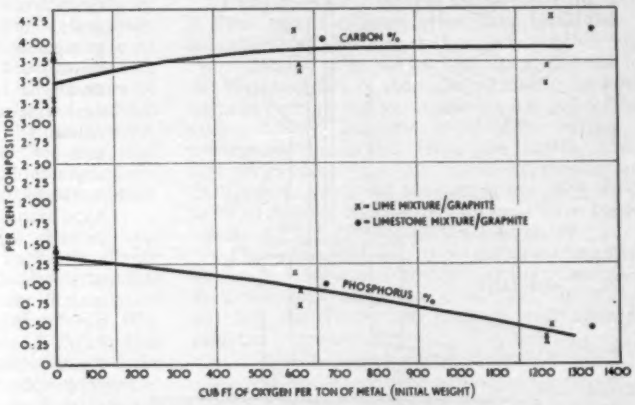

FIG. 2.—LABORATORY-SCALE TREATMENT OF PHOSPHORIC IRON.

TABLE 2.—*Iron and Steel Scrap: Laboratory Tests.*

Melt No.	Oxygen. Mins. at 600 cub. ft./hr.	Oxygen. Cumulative delivery eq. cub. ft./ton. of metal (initial wt.).	Slag-forming materials. Wt. of powder added in stages, lb.	Cumulative delivery of constituents, lb./ton of metal (initial wt.). Lime.	Limestone.	Ore.	Fluorspar.	Bauxite.	Nitrogen. Mins. at 72 cub. ft./hr.	Nitrogen. Cumulative delivery eq. cub. ft./ton of metal (initial wt.).	Graphite. Wt. of powder added in stages, lb.	Graphite. Cumulative delivery, lb./ton of metal (initial wt.).	Initial metal wt., lb.
	(5) 14-*in. dia. Basic Ladle. Lime-Ore-Spar Slag-forming Powder* (5 *parts lime; 5 parts ore; 1 part spar*)												
926	—	—	—	—	—	—	—	—	—	—	—	—	150
	3	448	7½	51	—	51	10	—	3	54	3	45	—
	3	896	7½	102	—	102	20	—	3	108	3	90	—
938	—	—	—	—	—	—	—	—	—	—	—	—	150
	3½	485	9	61	—	61	12	—	3½	58	3½	52	—
	3½	970	9	122	—	122	24	—	3½	116	3½	104	—
	(6) 14-*in. dia. Basic Ladle. Limestone-Ore-Spar Slag-forming Powder* (80 *per cent limestone; 14 per cent ore; 6 per cent spar*)												
927	—	—	—	—	—	—	—	—	—	—	—	—	150
	3½	523	9	—	108	19	8	—	3½	63	3	45	—
	3½	1,045	9	—	215	38	16	—	3½	125	3	90	—
937	—	—	—	—	—	—	—	—	—	—	—	—	150
	3½	560	10	—	119	21	9	—	3½	67	3½	52	—
	3½	1,120	10	—	239	42	18	—	3½	134	3½	104	—

TABLE 2.—(*contd.*)

Melt No.	Metal analysis. Total C, per cent.	Si, per cent.	S, per cent.	P, per cent.	Mn, per cent.	Slag analysis. SiO_2, per cent.	Total Fe, per cent.	P_2O_5, per cent.	CaO, per cent.	C, per cent.	Metal Temp. deg. C,
926	2.39	1.12	—	1.00	0.70	—	—	—	—	—	1,350
	3.40	—	—	0.75	—	—	—	—	—	—	1,460
	4.10	<0.01	—	0.26	0.02	—	14.3	—	—	—	1,430
938	2.27	0.81	0.092	0.92	0.48	—	—	—	—	—	1,390
	3.34	—	—	0.56	—	21.8	9.8	—	33.1	—	1,450
	4.14	0.03	0.041	0.21	<0.01	*8.0	18.1	10.5	45.2	2.1	1,350
927	2.41	0.80	—	0.98	0.53	—	—	—	—	—	1,435
	3.43	—	—	0.72	—	—	—	—	—	—	1,425
	3.42	<0.01	—	0.28	0.02	—	15.1	—	—	—	1,390
937	2.15	1.22	0.098	0.90	0.46	—	—	—	—	—	1,355
	3.78	—	—	0.63	—	23.8	13.5	—	34.8	—	1,365
	4.04	<0.01	0.034	0.15	<0.01	*3.0	13.6	7.4	43.1	14.4	1,315

* Some slag removed.

utilizing a mixture of iron and of steel scrap, and the third employing foundry-type irons. The metal was melted in an oil-fired Morgan crucible furnace and then transferred to the treatment ladle. The slag-forming powders generally consisted of mixtures of lime-iron ore-fluorspar or limestone-iron ore-fluorspar, but in one test, Melt 810, a lime-iron ore bauxite mixture was utilised. The carbonaceous material used was graphite. The slag-forming and graphite powders were sized to −20 to 120 mesh.

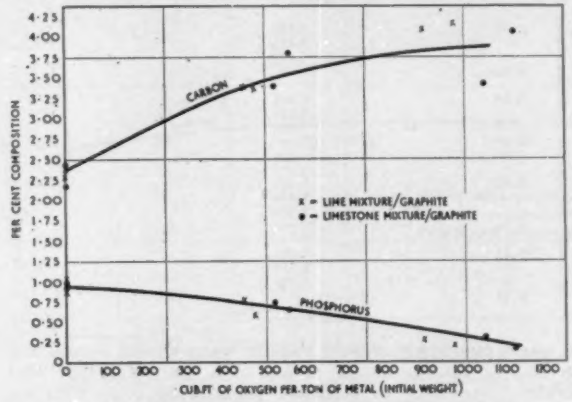

FIG. 3.—LABORATORY-SCALE TREATMENT OF IRON-STEEL SCRAP MIXTURE.

For the most part, the tests were planned to be carried out under a single slag, exceptions being Melt Nos. 937, 938 (Table 2), 975, 976 (Table 3), in each of which slag was removed at the intermediate stage. In some melts, however, notably in the third group, slopping during the treatment resulted in some slag removal by eruption.

Temperatures of the molten metal were measured by means of a quick-immersion thermocouple.

Foundry Trials

In view of the results obtained during the above tests it was decided to carry out trials on a pilot scale, treating about 1 ton of metal, and arrangements were made to set up equipment on a foundry site where there were facilities for the supply of ade-

TABLE 3.—*Treatment of Foundry-type Iron: Laboratory Tests.*

Melt No.	Oxygen.		Slag-forming Materials.					Nitrogen.		Graphite.		Initial metal, wt. lb.
	Mins. at 600 cu. ft./h.	Cumulative delivery, eq. cub. ft./ton of metal (initial wt.).	Wt. of powder added in stages, lb.	Cumulative delivery of constituents, lb./ton of metal (initial wt.). Lime.	Lime-stone.	Ore.	Fluor-spar.	Mins. at 72 cub. ft./h.	Cumulative delivery, eq. cub. ft./ton of metal (initial wt.).	Wt. of powder added in stages, lb.	Cumulative delivery, lb./ton of metal (initial wt.).	
974	(1) 8-*in. dia. Acid Ladle. Lime-Ore-Spar Slag-forming Powder.* (5 *parts lime;* 5 *parts ore;* 1 *part spar.*)											
	—	—	—	—	—	—	—	—	—	—	—	110
	3½	763	11	102	—	102	20	3½	92	2¼	46	—
	3½	1,527	11	204	—	204	41	3½	183	2¼	92	—
975	(2) 14-*in. dia. Basic Ladle. Lime-Ore-Spar Slag-forming Powder.* 5 *parts lime;* 5 *parts ore;* 1 *part spar.*)											
	—	—	—	—	—	—	—	—	—	—	—	150
	5½	821	12	81	—	81	16	5½	99	3	45	—
	5½	1,642	12	163	—	163	33	5½	197	3	90	—
	—	—	—	—	—	—	—	—	—	—	—	—
978	—	—	—	—	—	—	—	—	—	—	—	150
	5½	821	14	95	—	95	19	5½	99	3	45	—
	5½	1,642	14	190	—	190	38	5½	197	3	90	—
	—	—	—	—	—	—	—	—	—	—	—	—
976	(3) 14-*in. dia. Basic Ladle. Limestone-Ore-Spar Slag-forming Powder.* (70 *per cent. limestone;* 26 *per cent. ore;* 4 *per cent. spar.*)											
	—	—	—	—	—	—	—	—	—	—	—	150
	5	747	14	—	146	54	8	5	90	3	45	—
	5	1,493	14	—	293	109	17	5	179	3	90	—
	—	—	—	—	—	—	—	—	—	—	—	—
979	—	—	—	—	—	—	—	—	—	—	—	150
	5	747	16	—	167	62	10	5	90	3	45	—
	5	1,493	16	—	334	124	19	5	179	3	90	—
	—	—	—	—	—	—	—	—	—	—	—	—

NOTES

Melt 974: The treatment was carried out in an 8-in. dia. ladle, this being the only vessel available with an acid lining. A good deal of slopping occurred during the first blow during which almost all the slag and much of the metal was ejected from the converter. The lining appeared to be much eroded around the slag line after the operation. No ferro-alloy additions were made to the metal in this experiment.

Melt 975: The blows were without excessive slopping or ejection. Some slag was removed after the first blow. Further slagging was carried out after the second blow before the addition of ferro-alloys.

Melt 978: The quantity of slag-forming powder was increased, but no slag was removed between the blows. Some slag was taken off before the ferro-alloy additions were made in the final stages.

Melt 976: A fair amount of slopping occurred during the first blow and some metal was ejected. The slag formed was of a particularly foaming character. This slag was removed between the blows. The very dry slag produced during the second blow was removed before the ferro-alloy additions.

Melt 979: Much slopping during the first blow together with metal ejection. No intermediate slagging was carried out, but there was a removal of the slag—which finished in a very dry state, before the ferro-alloy additions.

TABLE 3.—(*contd.*)

Melt No.	Metal analysis.				Slag. Total Fe, per cent.	Metal temp., deg. C.	Ferro-alloy additions.	
	Total C, per cent.	Si, per cent.	P, per cent.	Mn, per cent.			75 per cent. FeSi, lb.	75 per cent. FeMn, lb.
974	3.60	1.65	1.05	0.77	—	1,378		
	3.46	—	0.76	—	—	1,480		
	3.28	—	0.047	—	—	1,390		
975	3.42	1.36	0.96	0.77	—	1,450		
	3.50	—	0.82	—	—	1,475		
	3.02	—	0.25	—	17.4	1,460		
	3.52	1.05	0.28	0.64	—	—	2	1
978	3.37	1.49	1.17	0.84	—	1,415		
	3.59	—	1.03	—	—	1,475		
	3.48	—	0.13	—	16.5	1,415		
	3.42	1.27	0.16	0.27	—	—	2	1
976	3.56	1.52	1.21	0.82	—	1,400		
	4.19	—	1.00	—	—	1,460		
	3.90	—	0.35	—	16.7	1,400		
	3.91	1.01	0.35	0.88	—	—	2	1
979	3.33	1.25	1.17	0.71	—	1,415		
	3.98	—	1.02	—	—	1,410		
	3.67	—	0.093	—	20.4	1,205		
	3.80	0.88	0.096	0.61	—	—	2	1

quate quantities of molten metal. The aim was to obtain substantial dephosphorization together with positive increases in carbon content under these conditions.

It was realized from the onset that, ideally, the equipment should include water-cooled lances and a tilting reaction vessel of a converter type that would be of sufficient capacity to cope with the agitation of slag and metal. At this stage in the development of the process, however, it was

TABLE 4.—*Foundry Experiments.*

Trial No.	Oxygen. Time. Min.	Sec.	Flow rate, cub. ft. per min.	Total cub. ft.	Slag-forming powders. Lb. added.	Constituents of powder, lb. Lime.	Iron ore.	Fluor-spar.	Nitrogen. Time. Min.	Sec.	Flow rate, cub. ft. per min.	Total, cub. ft.	Graphite, lb. added.	Estimated approx-imate weight of initial metal, cwt.
	(*a*) *Preliminary Trial.* 2½-*ton Ladle.* 200 *cub. ft. per min. Oxygen Rate.*													
1	—	—	—	—	—	—	—	—	—	—	—	—	—	20
	7	10	200	1,416	400	182	182	36	1	0	3	40	95	—
									6	10	6			
	(*b*) *Foundry Tests.* 5-*ton Ladle.*													
1	—	—	—	—	—	—	—	—	—	—	—	—	—	20
	15	10	100	1,517	550	250	250	50	1	30	3	73½	110	—
									13	50	5			
2	—	—	—	—	—	—	—	—	—	—	—	—	—	25
	19	30	100	1,950	625	250	300	75	19	30	5	97½	110	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	—	—	—	—	—	—	—	—	—	—	—	—	—	19
	12	0	120											
	1	25	100	1,625	600	350	200	50	14	0	5	70	110	—
	0	45	80											

TABLE 4.—(*contd.*)

Trial No.	Metal analysis. (per cent.). Total C	Si	S	P	Mn	Slag analysis. (per cent.). SiO_2	Total Fe	CaO	Metal temperature, deg. C.	Notes.
1	3.16	2.33	0.120	0.76	—	—	—	—	1,360	Much slopping occurred during this blow and considerable quantities of slag and metal were ejected, thus increasing the oxygen-powder/metal proportions. It was evident that the blowing rates were too high for the ladle capacity.
	3.93*	Trace	0.004	0.02	Trace	12.0	15.6	48.3	1,320	
1	3.14	2.24	0.144	0.89	0.54	—	—	—	—	—
	4.06†	1.12	0.103	0.23	0.06	23.9	12.1	42.8	—	—
2	3.22	2.28	0.162	0.89	0.60	—	—	—	1,290	—
	4.13*	0.06	0.120	0.11	Trace	25.9	13.1	47.3	1,290	—
	4.17†	0.33	0.092	0.08	Trace	—	—	—	—	—
3	No sample					—	—	—	1,299	Metal similar in composition to initial metal of other tests.
	4.60*	Trace	0.048	0.10	Trace	24.4	8.8	48.5	—	—
	4.20†	0.48	0.079	0.09	Trace	—	—	—	—	—

* After treatment.
† After treatment and after ferro-silicon addition in transfer ladle.

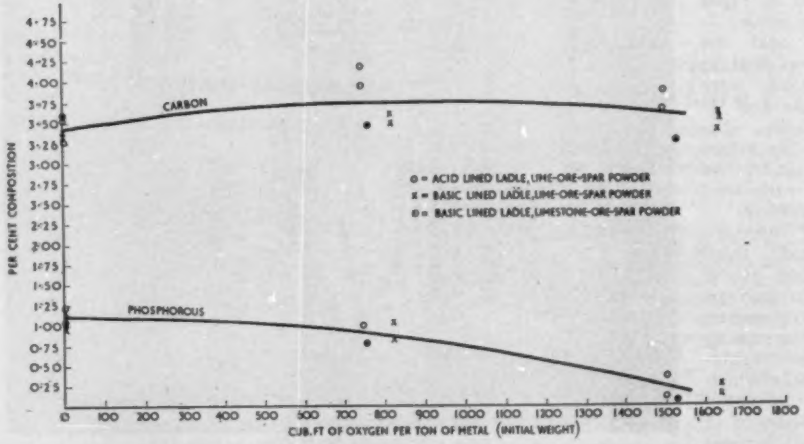
CARBON
PHOSPHORUS
PER CENT COMPOSITION
CUB. FT OF OXYGEN PER TON OF METAL (INITIAL WEIGHT)
o = ACID LINED LADLE, LIME-ORE-SPAR POWDER
x = BASIC LINED LADLE, LIME-ORE-SPAR POWDER
⊙ = BASIC LINED LADLE, LIMESTONE-ORE-SPAR POWDER

FIG. 4.—LABORATORY-SCALE TREATMENT OF FOUNDRY-TYPE PHOSPHORIC IRON.

resolved to limit the equipment to that available or readily applicable to the particular site, and to employ uncooled, but refractory - coated, steel lances to blow into an ordinary basic-lined foundry ladle.

After a preliminary trial (Table 4) in which there was much splashing and considerable slag and metal spillage due to the employment of too high oxygen rates for the

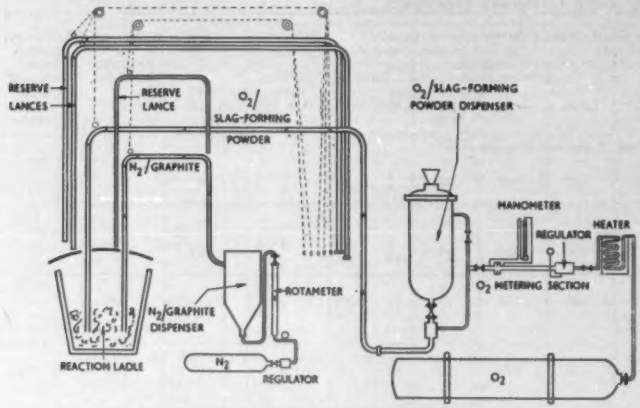

FIG. 5.—GENERAL ARRANGEMENT OF PILOT PLANT.

relatively small ladle used it was decided to employ oxygen blowing rates of around 100 cub. ft./min. together with a ladle of larger capacity. Provision was also made for the rapid replacement of consumed lances. A sketch of the arrangements is given in Fig. 5 and photographs are in Figs 6 and 7. Incidentally, in this trial exceptionally low-phosphorus and sulphur contents of the final metal were achieved.

In practice, the three 1-in. internal dia. oxygen and two ½-in. internal dia. nitrogen lances provided for a blow, each individually cable-suspended and connected to separate hoses, were grouped in two sets of pivoted guides so that by the movement of a lever any particular lance could be located in position for lowering through the appropriate opening in the ladle cover. A simple bayonet connection at the dispenser end of the hose enabled a rapid change of line to be made.

The slag-forming and the recarburizing powders, sized to pass a 10-mesh sieve, were supplied from 6-cwt. and 1-cwt. nominal capacity dispensers, respectively, the larger being arranged for a relative high gas to powder ratio and the smaller for the reverse.

The oxygen and nitrogen gases were supplied from cylinders and metered at 50 and 20 lb./sq. in. through an orifice plate and a rotameter, respectively, the oxygen passing through a heater before regulation. The foundry ladle which was utilized as a reaction vessel had a nominal capacity of 5 tons and was lined with a magnesite-chrome mix.

For the operation, the estimated quantity of cupola-melted scrap metal of composition range:—T.C. per cent., 3.1 to 3.2; Si per cent., 2.1 to 2.4; P per cent., 0.7 to 0.9, was poured from a transfer ladle into the reaction vessel which was then conveyed to the blowing site. After swinging the blowing apparatus and cover lid into position and initiating the gas flows, the treatment was commenced by lowering the end of the lances below the surface of the molten metal. The dispensation of the oxygen-carried slag-forming powder and the nitrogen-borne graphite was started generally at the onset of the blow, the treatment being continued with only short breaks for lance changes until conclusion.

Results

The results of the laboratory tests are given in Tables 1, 2, and 3 and are shown graphically in Figs. 2, 3, and 4. The results obtained in the foundry experiments are given in Table 4.

The relationships between the final compositions and the quantities of gas and powder used in the experiments are not necessarily fully representative for any large-scale practice owing to metal losses which at times arise from spillage resultant on the use of relatively small capacity vessels.

The large increases in carbon obtained in the iron-scrap mixture group are of especial interest

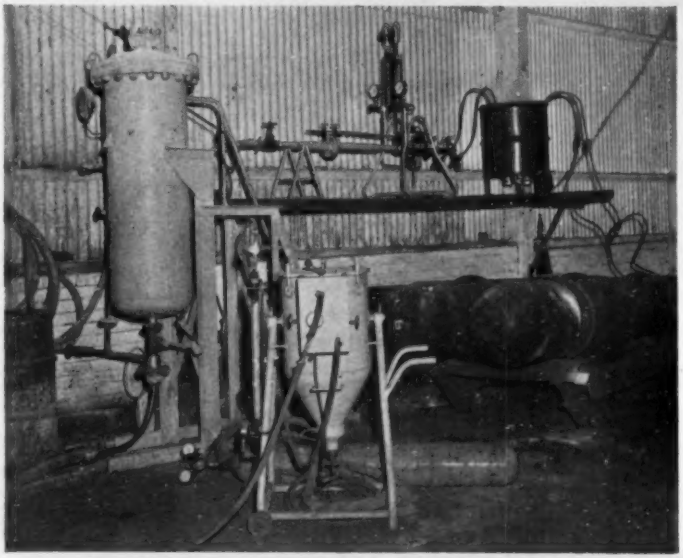

FIG. 6.—FOUNDRY TRIALS: DISPENSING EQUIPMENT.

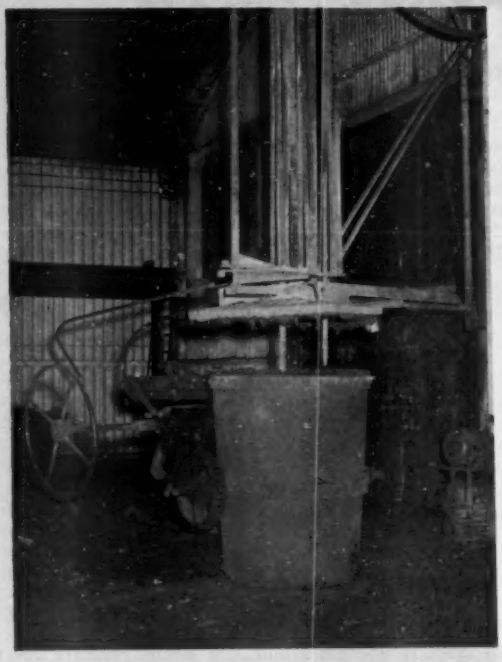

FIG. 7.—FOUNDRY TRIALS: LADLE AND LANCES.

as the initial cost of such a mixture made up of remelted scrap iron and steel is sufficiently below that of low-phosphorus content foundry pig to leave a considerable margin to cover the cost of treatment and of the silicon and manganese additions which would be required to bring suitably treated metal to foundry requirements.

Test pieces machined from samples cast from irons resiliconized after treatment by the dual dispensation method have shown tensile strengths comparable with ordinary irons of similar composition.

During the course of the experiments there have been indications that iron of the hematite variety could be produced under suitable conditions. There is also the possibility that the process might have applications in steelmaking practice for the pretreatment of phosphoric irons or even for the rapid transformation of low-carbon phosphoric melts into high-carbon low-phosphorus baths required for the refining of quality steels.

Acknowledgments

Acknowledgments are due to the directors of British Oxygen Research & Development, Limited, for permission to publish this paper; to Mr. W. J. B. Chater for his unfailing encouragement, and to Mr. D. Pullen and Mr. L. D. Lamb for their major contributions towards the design of equipment and conduct of the test.

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The Science of Modern Management Training

IMPORTANCE of training people in the principles of modern management, including their relationships with other people and departments, was stressed by Mr. D. L. Nicolson, managing director of Production-Engineering, Limited, industrial consultants, of London, S.W.1, in an address to a British Institute of Management conference in London recently. He said that a firm's work-study department need not function solely to set piece-work rates, but could be a training ground for the university graduate and future foremen, and provide "appreciation courses" for shop stewards.

The training of an efficient team took time, he said, and some managements expected too much too quickly from individuals after short instructional courses or brief experience. Training should be a long-term policy based on thorough research, analysis, and selection of talent, and for this reason it was necessary to choose and train promising men as early as possible.

"As in the case of doctors and illness," Mr. Nicolson continued, "efficient management should seek prevention rather than cure of malaise such as labour redundancy. Although often difficult to achieve, its long-term production programmes should strive to promote maximum stability of employment." Where there were gaps or uncertainties, the possibility of alternative products or outlets should be investigated. Good forecasting based on market research, economic studies, and organization which permitted accurate programming could help management make the right decisions.

Indo-American Compromise on Bokharo Expected

INDIAN and American attitudes to the prospective fourth steel plant at Bokharo seem to be moving towards a compromise. Although no specific allocation has been made for the fourth plant, which is included in the Third Five Year Plan, it has generally been accepted that the US steel industry would collaborate with India in its construction.

The Indian Government has previously insisted that the undertaking should be a 100 per cent. public sector project. Correspondingly, the US steel interests have pressed for a 100 per cent. private enterprise undertaking. It now appears that neither side is as inflexible as it appeared and a compromise involving the allocation of 50 per cent. of the equity capital to private Indian and US investors is now being mentioned.

If an agreement is to be reached the most difficult problem to be solved will be one of management. The Americans may try to insist that their own men undertake management for a specified number of years.

New Diesel-hydraulic Locomotive

A NEW model incorporating diesel-hydraulic transmission has been added to the range of locomotives produced by Ruston & Hornsby, Limited, Lincoln. Designated the 165 DH, this latest Ruston shunter is fitted with the Ruston six-cylinder YEXL turbo-charged diesel engine and a twin disc, series 10,000, three-stage torque converter, which, with the Ruston reverse-reduction gearbox, allows the most efficient utilization of power throughout the whole range of haulage duty demands.

The 165 DH is available with 0-4-0 wheel arrangement suitable for gauges of 4 ft. 8½ in. to 5 ft. 6 in., or with an 0-6-0 arrangement suitable for gauges of

RUSTON & HORNSBY'S LATEST DIESEL-HYDRAULIC LOCOMOTIVE.

3 ft. 3½ in. to 5 ft. 6 in. The working weight is 28 tons for both the four- and six-wheel models.

Although adhesion may vary considerably—from approximately 300 to 750 lb./ton of locomotive weight, according to track and weather conditions—the maximum starting tractive effort of 16,200 lb. for the 165 DH can be obtained with an adhesion of 578 lb./ton. At 1.5 m.p.h. a tractive effort of 13,700 lb. is obtainable with an adhesion of 495 lb./ton.

Goodyear HDNF Conveyor Belts for Chile

A 1,000-ft. Goodyear HDNF conveyor belt containing heavy duty nylon fill fabric—the biggest belt of this type built in the company's industrial products plant at Wolverhampton—is being prepared for shipment to Pedro de Valdivia, in the north of Chile, together with, another belt of the same size (48 in. by 7 ply). The belts have been ordered by the Nitrate Corporation of Chile, Limited, for the Cia. Salitrera Anglo-Lautaro's nitrate of soda producing plant. Each belt, weighing approximately 10 tons, is constructed in 42-oz. HDNF fabric with $\frac{1}{16}$-in. top cover, including nylon transverse breaker, and a $\frac{3}{32}$-in. bottom cover.

Limiting Torque on Steam Winders

A SYSTEM to prevent overspeed in steam-wound colliery cages approaching shaft bottoms when men are being wound has been devised by Mr. D. R. Allin, mechanical engineering assistant in No. 4 Area of the East Midlands Division of the National Coal Board. The object of the system is to counteract the lack of sensitivity and time-lags in winding control equipment on occasions when a sudden application of power occurs.

The principle of Mr. Allin's system is to trip the engine controller if excess torque in favour of motion is applied when the cage is approaching the shaft bottom. Tripping is achieved by a spring- or weight- operated catch normally held by an electromagnet supplied by a low-voltage d.c. circuit. In an emergency, the magnet is de-energized and the catch is released to trip the controller.

To ensure that tripping only occurs when the cage is approaching the end of the wind, the system provides for the magnet to be energized at all other times. This is done by providing a circuit containing a switch which is operated by a cam gear linked with the shaft of the winding drum. The switch is closed except when a descending cage is within a fixed distance of the shaft bottom, and when the switch is closed the electromagnet is energized and full steam pressure can be applied to the engine. The cam gear is directional and allows full reverse power to be applied when approaching bottom and full power when raising from the bottom.

In parallel with the circuit containing the cam gear switch is a second circuit through which the electromagnet is still energized even when the cam switch is open, unless emergency conditions arise. In this second circuit are two trip switches operated, respectively, when excess steam pressure or excess throttle movement occur. If either of these conditions should occur when the cage is approaching pit bottom (and the cam switch has opened), the second circuit is also broken, the magnet is de-energized, and tripping occurs.

The trip switch, controlled by steam pressure, is actuated through a spring-loaded adjustable pressure cylinder, and the switch controlling throttle movement is operated by a striker on the throttle handle itself. A master switch cuts the tripping circuit when men are not being wound.

US Deep-drawing Sheet for East Germany

A contract for the delivery of 10,000 tons of deep-drawing sheet and hot-rolled strip for the East German motor industry has been negotiated between Deutsche Stahl- und Metall-GmbH and a group of US firms consisting of the Possehl Ore & Metal Corporation, New York, and the Sutton Steel & Metal Corporation. Deliveries are to take place in June. The Sutton Steel & Metal Corporation plans to attend the 1961 Leipzig Spring Fair for the first time as an exhibitor. The firm has been a buyer of East German chemicals for some years.

FAST MOVING FACES

By F. FAIRCLOUGH, M.I.Min.E.

During the last five years, the proportion of power-loaded coal from the No. 5 Area of the North-Eastern Divisional Coal Board has increased from 5 to 50 per cent. of the total output. The majority of the coal to be worked is 3 ft. 4 in. or less in thickness, and, consequently, high rates of machine travel and face advance have had to be obtained in order to achieve success. In this abridged version of a paper presented to the Midland Institute of Mining Engineers, the author discusses the new problems and possibilities of advancing large longwall faces at rates of from 20 to 30 yd./week.*

CONTINUOUS mining methods, producing coal on three shifts, have many advantages and it is only recently that the full potential of these methods has begun to be exploited. The combination of high rates of advance per shift and of three-shift working has resulted in power-loaded longwall faces producing very high tonnages and advancing at rates equivalent to 32 yd./week. Such high rates of advance create new problems and can revolutionize colliery layout. Great improvement in the performance of certain collieries has already been obtained by reducing the number of faces and working the smaller number on three shifts.

When planning the layout of a district or of a whole mine, it would seem to be sound policy to obtain the required output from the smallest number of the most efficient faces, working the maximum amount of time. It is, therefore, of importance to consider the factors which will determine the dimensions of the ideal non-cyclic face.

Design of Power-loaded Faces

As power-loading machines, face conveyors and roof supports become more powerful and more effective, there is a tendency to assume that the greatest efficiency and lowest cost will be obtained from the largest face that the natural conditions will allow. Experience in No. 5 Area of the North-Eastern Divisional Coal Board has proved this to be true only within certain limits.

Non-cyclic power-loaded faces in No. 5 Area have varied from 100 to 300 yd. in length. The number of gates has gradually been reduced as roof control and confidence have improved. Up to date, the maximum length of a two-gate face has been 250 yd. and of a three-gate face 300 yd. Individual faces have altered in length with comparatively little change in bulk output because, where a face has shortened, the length of machine travel has been nearly maintained by a corresponding increase in face advance per shift.

The longer the face, the smaller the proportion accounted for by the stable holes, which are three and a half times more expensive than the machine length. This improvement, however, is partially offset by the fact that a longer face advances more slowly and the slower the rate of advance the less efficient is the work in the stable holes.

The efficiency of the other front face men increases as the face lengthens, because the number of times which the machine travels up and down the face is reduced, with a corresponding reduction in the short periods of unproductive work associated with each move forward. This factor is becoming less important with the introduction of self-advancing supports.

Against this all-round improvement in face labour must be set the depreciation cost of coal-face equipment. As the face lengthens, so the cost of depreciation rises at a constant rate and the cost of face labour falls at an ever decreasing rate. As a consequence, the overall improvement gets less and less as the face lengthens. Where self-advancing supports are installed, depreciation cost can actually outweigh labour cost. So far as the coal face is concerned, the point has now been reached at which labour cost is no longer the largest single item in the total cost of working.

The ideal face length is, therefore, that which yields not only the highest efficiency, but also the lowest combined cost of labour and depreciation. For the conditions normally encountered in No. 5 Area, the ideal design at present lies in a length of between 200 and 250 yd. with only two gates for single-shift working.

Effects of Multi-shift Working

It has been the experience of No. 5 Area that there is no falling off in the tasks of individual men or teams of men when working on two, or even three shifts. This being so, the overall performance of the face as a whole has greatly improved. Bulk output has increased in relation

TABLE 1.—*Face Length, Output per Shift and Advance per Shift.*

Face.	Face length.	Pithead output per shift.	Rate of advance per shift.
	Yd.	Tons.	Ft.
A	136	281	6.15
	150	308	6.05
	203	310	4.46
B	170	240	3.95
	200	248	3.07
	220	254	2.80
C	200	384	5.01
	250	399	4.07

* The paper will be published fully in the Transactions of the Institution of Mining Engineers.

to the number of shifts worked by the front face men and one non-cyclic power-loaded face, working three shifts, virtually constitutes a small mine in itself, producing over 5,000 pithead tons per week.

It has been possible to improve the efficiency in the stable holes in those cases where the rate of face advance per shift was of the order or 4 ft. 6 in. When working on three shifts, such a face advances 13 ft. 6 in. per day and it has been possible to advance the stable by two cuts of 6 ft. 9 in. instead of three cuts of 4 ft. 6 in.

As with the stable holes, a day's ripping has been taken in two lifts instead of three, yielding a considerably greater cubic measure per man than previously. It might be argued that, with single-shift working, the ripping teams could be held off until the longer rip was available for them. This does not work well in practice because the condition of the ripping deteriorates over the period of time involved and the workmen have to change either their time of shift or their working place each day.

The degree of improvement brought about by increasing the length of face is, therefore, greater where multi-shift working is employed because the benefits of rapid advance, which long faces tend to lose on a shift basis, can be retained on a daily basis. The cost of depreciation is reduced by a half or two thirds, as the case may be and the face length at which reduced labour cost is overtaken by increased depreciation cost is very much greater.

Rates of Advance

In view of the comparative thinness of the seams, it is the policy of No. 5 Area to avoid linked-bar systems of support and to obtain the greatest depth of strip possible, commensurate with a reasonable rate of machine travel and size of product. Both trepanners and shearers in No. 5 Area at present produce an effective strip of 2 ft. 2 in. on average. The normal rate of advance per shift varies between 4 ft. 4 in. and 6 ft. 6 in., according to face length. When working on three shifts, therefore, the daily advance is between 13 ft. and 19 ft. 6 in.

Theoretically, the figures should give advances of up to 32½ yd./five-day week; such a rate is maintained in practice for about three consecutive days, but, owing to poor attendance at the beginning and end of the week, the advance for the week has not yet exceeded 26½ yd.

Experience has shown that the rate of gas emission may increase, sometimes out of all proportion, with increased rate of advance. One face in the Top Fenton Seam gave off methane at the rate of 16 cub. ft./min. when working on two shifts. This increased to 33 cub. ft./min. when working on three shifts.

Where a smaller number of fast moving faces are adopted in order to maintain a given output, the number of ventilation splits will be reduced and the quantity of air in each split must be increased. The total quantity of air reaching the face must be greater, though the necessary increase may be provided by reduced leakage.

The faster the face advances, the more violent is the movement of the strata surrounding it. This does not affect the working area of the face itself, which usually tends to improve the faster it travels. Wing gates have not been unduly affected but centre gates have suffered severely. For this reason, centre gates are being dispensed with wherever ventilating conditions permit. Where this is not possible, much greater attention has to be paid to stilting and other means of accommodating subsidence, or it may even be necessary to carry larger gates at the face.

Rapid Advance, Colliery Layout, and Supervision

The layout of a colliery's workings is dependent on many factors, such as geological conditions, marketing demands, shaft capacity, bunkerage, and transport facilities, etc. Having satisfied all these conditions it must still be sound policy to have the minimum number of coal faces of the ideal dimensions and to work each face as many hours per day as possible. Such a policy will ensure not only the optimum face performance, but also the highest degree of concentration, with the minimum amount of equipment to be depreciated and maintained.

The degree of concentration of a mine has been measured in terms of tons per yard of main haulage road. This figure is the product of the length of face per yard of main haulage road and of the daily output per yard of face. For any one seam, the daily output per yard of face is proportional to the rate of advance. Rapid advance, therefore, increases the concentration at the face.

For any given output, the faster the faces advance, the less face room will be required. This is accompanied by a comparatively small reduction in length of main haulage road, particularly if the workings are some distance from the pit bottom. The apparent effect is to reduce the geographical concentration in length of face per yard of main haulage road.

However, the increase in face concentration outweighs the apparent reduction in geographical concentration, with a consequent increase in overall concentration. This increase will be the more striking, statistically, the nearer the working districts are to the pit bottom.

If the colliery output is to remain the same after changing over to rapid advance, the quantity of consumable stores to be imported daily will not alter. Larger quantities of supplies will be required at fewer destinations. The simplification of both coal and materials transport systems must result in economies. The disposal of dirt may present a problem, and consequently, as much as possible must be stowed in the pit or be transported by means other than those used for coal.

Most conveyor systems are manned on at least one more shift than the number of coaling shifts worked, if only with a skeleton staff. It has been found in practice that the full manning of trunk systems on all three shifts is more than offset by the simplification of the system and the larger daily outputs handled by the tributaries, resulting in an

overall improvement in underground transport cost per ton.

The supply of materials for fast moving faces requires a haulage in every gate which must be both efficient and capable of rapid and economical extension. A device has recently been developed to meet these requirements with a reversible endless rope haulage. It consists of a small bogey, carrying a spinner on which is coiled and clamped 600 to 1,000 yd. of surplus haulage rope. This bogey travels backwards and forwards all the time. A short passbye must be provided at the outbye end of the roadway to allow supply vehicles to travel past it. The supply vehicles should be clamped to the rope as close as possible to and on the inbye side of the bogey.

When the haulage is to be extended, the rope is unclamped and the return wheel moved inbye to its new position, pulling the additional rope off the spinner, which will be at the inbye end of the roadway during the operation. The rope is then tightened and reclamped, any slack rope being rewound on to the spinner. This operation does not require a skilled rope man, whose services will be needed only once in every 300 to 500 yd. of advance.

It could be argued that the more intense activity of three-shift working will demand a higher degree of supervision. But most modern pits are already fairly well staffed on the back-shifts. There is a considerable improvement owing to the reduced number of deputies' districts. Supervision is more concentrated and, therefore, more effective. Less time has to be spent in travelling and senior officials can visit each working face more frequently. All tasks at the face are proceeding simultaneously on all three shifts and there is a better understanding and integration of the work as a whole.

CONCLUSION

Ever-increasing numbers of non-cyclic power-loading installations are being introduced. More and more coal-face operations are being mechanized and the quantity and value of the equipment installed on the face continues to rise. The potential of non-cyclic methods must be exploited to the full by continuous working on three shifts per day, in order that depreciation charges may be kept within economic limits and the optimum results achieved.

Practical experience has shown that three-shift working not only increases the degree of concentration of mine workings, but can also improve the performance of the individual coal faces to which it is applied. For any given number of gates, the longer the coal face, the lower is the labour cost, but the higher the cost of depreciation. The faster a coal face advances, the cheaper is the labour cost, because the work in the rippings and stable holes becomes more efficient. By continuous working on three shifts, the maximum advantage can be obtained both from long faces and from rapid advance.

Large longwall faces have advanced as much as 26½ yd. in a five-day week, in three different seams and at various depths. Such rates of travel have increased the severity of strata movement and of gas emission, but not to an extent which is prohibitive.

The effect of a few such fast moving faces has been to revolutionize the performance of whole collieries in a very short space of time. There seems to be no reason why three-shift working should not be adopted as widely and as rapidly as possible. In view of the experience already gained, the ultimate aim must be the design and layout of complete collieries for the specific purpose of continuous operation on three shifts per day.

New Literature

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below. They are acknowledged with thanks.

GLACIER METAL COMPANY, LIMITED, Alperton, Wembley (Middx)—No. 2 in the series of designer's handbooks issued by the company deals with dry bearings and materials.

FLUIDRIVE ENGINEERING COMPANY, LIMITED, Worton Road, Isleworth (Middx)—The first of a series of articles on "Fluidrive for Pulp and Paper Machinery" is contained in the June issue of Fluidrive News.

TIMKEN ROLLER BEARING COMPANY, Duston (Northants)—News and articles concerning the Timken organization are contained in Timken, a monthly magazine, the May issue of which is now available.

JOY-SULLIVAN, LIMITED, Cappielow, Greenock, Scotland—The Joy 12 BU loader, a highly mobile machine designed to load, continuously, prepared material in thin seams, is the subject of an interesting field report. Since its introduction in 1956 more than 100 of these machines have been delivered to collieries in this country.

STURTEVANT ENGINEERING COMPANY, LIMITED, Southern House, Cannon Street, London, E.C.4—Two new catalogues issued by the company deal with the "Newgate" dust collector (publication No. 3504) and fans for mechanical draught (No. 3505). The latter runs to 24 pages and contains a great deal of useful information.

POLLARD BEARINGS, LIMITED, Ferrybridge, Knottingley (Yorks)—Information regarding the latest range of self-lube ballbearing pillow blocks and bearing units is given in a new catalogue. Technical description, bearing selection information, and a service factor graph are included, as well as the usual dimension and load-ratings tables.

VISCO ENGINEERING COMPANY, LIMITED, Stafford Road, Croydon—The company's range of rotary feed valves for feeding and discharging powder, dust, and granular materials to and from spiral conveyors, chutes, hoppers, mills, cyclones, etc., is described in leaflet No. 602. Both standard-type and vacuum-type valves are described and dimension diagrams and a throughput chart are included.

HENRY WIGGIN & COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—The latest edition (No. 56) of Wiggin Nickel Alloys includes an article on "Eddy-current Testing," one of the methods employed to check the quality of the company's materials before they leave the works. Contrasting uses of nickel and nickel alloys are featured—from anodes for electroplating, and of the oldest and best known applications, to the use of some of the Nimonic series of heat-resisting materials in the Zenith experimental gas-cooled nuclear reactor.

New South Wales Coal Industry

PROBLEMS OF OVER-PRODUCTION

OVER-PRODUCTION of coal is currently a world-wide phenomenon. According to the annual report of the Joint Coal Board, however, the New South Wales coal industry has faced this difficulty effectively. Following a fairly steady, but not dramatic, rise over some years, colliery stocks rose dangerously in the six months ended December 31, 1958.

The board made it clear to all concerned that in the best interests of the industry this situation should not continue. As a result, shortly after the end of 1959 colliery stocks were at the same level as when the year began. Whereas in June, 1958, stocks were rising, since February, 1959, they have been steadily falling. This has been due partly to restraint by efficient mines which could have produced more coal for stocking in advance of sale, and partly by the reduction in output or closure of other collieries in the face of growing competition.

The outlook for the future is that the productive capacity of the industry will continue to increase at a greater rate than the demand for coal.

Keen Competition

The New South Wales coal industry faces big changes in the next 10 years. The chief problem facing it, apart from the structural changes likely to eventuate during the '60s, is the problem of surplus productive capacity. Competition in the markets for coal is very keen and is becoming keener. This, in itself, is no bad thing, so long as the price competition does not endanger the stability of the industry.

It was the financial weakness of the industry, resulting from the excessive competition of the '30s, which meant that, in the '40s, New South Wales coal mining became almost a slum industry. Already, there are some straws in the wind which presage the possibility—fortunately as yet a good way off—of another financial drought in the industry.

It is impossible to point to a colliery with intermittent production in 1959, a feature which was a blight of the industry in the '30s. There is evidence that the actual selling prices of a number of collieries are not high enough to provide adequate depreciation allowances.

Not the least of the difficulties which must be faced in the next few years is the fact that some existing collieries will probably close, but before that happens, in the struggle to retain a foothold in the market, they may injure the industry which remains.

Possibility of Further Closures

In the changes that have taken place in the last 10 years, mines have gone out of production and proprietors have seen costly assets become of little value.

Many working in the industry have been displaced and have had to seek other employment. This pattern will continue in the '60s. In the Joint Coal Board's view there will be no producer in existence in NSW in 10 years' time, possibly less, whose pithead costs exceed the equivalent of 50s./ton in terms of present money value. Unfortunately, there are more than a few collieries where costs greatly exceed this figure.

Referring to the Joint Coal Board itself, the report states that the present prosperity and strength of the New South Wales coal industry is the direct outcome of the policies which the Commonwealth and State Governments have endorsed in the last 12 years. The instrument for carrying out these policies has been the board. Having regard to the coal-mining industry and to the basic contribution it makes to the efficient functioning of Australian economy, the report states that it is a matter of critical importance for the country that the industry continues to be given supervision and guidance.

Action along these lines will preserve the stability and progress of the industry which is basic to its prosperity; without such action it could falter and its condition deteriorate. Should this happen, the board points out, the community as well as the industry would suffer.

Mining Qualifications Board Examinations

OF the candidates for the mine manager's first-class certificate of competency who sat for the examinations last November, 37.2 per cent. were successful, the Mining Qualifications Board announces.

The half-yearly written examination was held at various centres on November 17, 18, and 19, and there were 379 candidates for the first-class certificate, of whom 141 qualified for the certificate and 46 qualified for re-examination last month. The maximum number of marks was 600. No candidate (excluding three-stage examination candidates) got more than 450 marks. Six candidates received fewer than 200 marks, 18 between 200 and 250, 69 between 250 and 300, 80 between 300 and 345, 31 between 345 and 400, and four between 400 and 450.

Of 178 candidates for the second-class (under-manager's) certificate, 74 qualified and 20 qualified for re-examination, the percentage qualifying being 41.6.

Development of Research in

The Italian Iron and Steel Industry

Particular interest attaches to this article, which is exclusive to IRON AND COAL, *in view of the recent special meeting of the Iron and Steel Institute in Italy. Prof. Scortecci was the joint author of one of the papers presented at the Iron and Steel Institute's joint meeting with the Associazione Italiana di Metallurgia in Milan, which formed part of the special meeting.*

By Prof. ANTONIO SCORTECCI

DEVELOPMENT OF THE INDUSTRY

CRUDE steel production in Italy reached its maximum output of nearly 7,000,000 tons in 1957, thus placing the country in seventh position among the major producers of steel, after the USA, the USSR, Germany, Great Britain, France, and Japan. This level was reached as the result of an exceptional increase in production; in 1950, it will be recalled, the prewar figure of 2,500,000 tons had not yet been achieved.

All this was the fruit of a courageous programme of modernization and structural reform applied throughout the Italian iron and steel industry, which was not only rebuilt following wartime devastation, but also modernized and reorganized in accordance with the very latest ideas in the world's iron and steel industries, such as the concentration and specialization of plant, the grouping of small enterprises in larger industrial units, and, most important of all, the creation of "integral cycle" iron and steel centres located in coastal zones and, if possible, near the major steel-consuming centres.

The Italian iron and steel industry, owing to the natural scarcity of mineral iron deposits, and the total lack of coking coal, developed from the very beginning by the solid charge process; scrap, however, had to be imported for the most part and, in recent years, from increasingly distant sources. This affected the cost of production to an appreciable extent and prevented the industry from competing with those of other countries with a longer iron and steel tradition behind them.

The Italian industry did, in fact, benefit from the escape clauses introduced in the High Authority (ECSC) treaties, including the parity fund which equalized the price of imported scrap iron for all the countries of the Community. But the main reasons for its development must be sought in the structural revolution that it underwent in accordance with the recommendations contained in the plan drawn up by Engineer Sinigaglia, the first president of Finsider after the war.

The Finsider group, in conformity with the precepts of this plan, according to which a poorly located steelworks in Italy is not *ipso facto* in an ultra-marginal position as far as the supply of raw materials is concerned, reorganized and consolidated the two steelworks at Bagnoli and Piombino and created a new "integral cycle" centre on the Ligurian coast at Cornigliano, Genoa, for the production of flat-rolled products. This allowed the Italian iron and steel industry to attain the competitive level that it is still in the process of perfecting. In this it was assisted by the expanding industrialization of the Italian economy in the post-war period, which absorbed ever-increasing quantities of steel, and by the extremely favourable circumstances of the 1955-57 period.

If the increase in steel production were exceptional, no less striking was the financial effort sustained by the country to provide the necessary investment. To nearly $300,000,000 invested in the immediate post-war period was added an even larger sum in the years 1952-58. Details are as follow (in million dollars):—1952, 105.20; 1953, 68.72; 1954, 35.85; 1955, 35.91; 1956, 51.59; 1957, 79.15; 1958, 69.28.

The most significant achievements of the post-war period were, in the first place, the new "integral cycle" plant at Cornigliano, with two blast furnaces yielding 750 ton/24 hr., six Siemens Martin furnaces producing 180 tons, hot and cold strip rolling mills for the production of flat-rolled sheets, and the new blast furnaces at Piombino and Bagnoli.

In 1948 there was only one Siemens Martin furnace with a capacity of 100 molten tons, but by 1958, 16 Italian furnaces had a capacity greater than this and six reached 250 molten tons; in this decade Italian Siemens Martin furnaces as a whole increased their output capacity by 83 per cent. With regard to electrically operated furnaces, furnaces of small and medium capacity were replaced by more powerful ones; 1959 saw the introduction of 28 new electric furnaces with capacities varying from 30 to 75 molten tons, and these alone accounted for 45 per cent. of the steel produced by electric furnaces.

In the steel-rolling sector, the last decade (1948-

58) has witnessed the introduction of three blooming rolling mills, five roughing mills, two continuous and semi-continuous rod mills, eight rolling mills for profiled sections, three continuous and semi-continuous wide strip rolling mills (one of which is a planetary mill), one narrow and medium semi-continuous strip mill, two tube mills, and two circular hoop mills, while many others have been modernized. Two continuous casting plants and one vacuum casting plant also came into operation.

Among the aforementioned new installations special mention should be made of the continuous billet mill, the continuous rod mill, the Bagnoli (ILVA) semi-continuous strip mill, FIAT's continuous mill for billets and plates, FALCK's high-capacity thick sheet/plate mill at Sesto S. Giovanni, SIAC's fourth thick sheet rolling mill, TERNI's plant for magnetic sheet steel, the tube mills belonging to DALMINE, FALCK, and FIAT, FALCK's cold-rolling reversible strip mill, a cold-rolling mill and a tinned strip plant at Naples, TERNI's continuous casting plant, and SIAC's vacuum casting plant.

Projected investment in the Italian iron and steel industry for the period 1959-63 provides for further development, including the creation of a fourth "integral cycle" iron and steel centre at Taranto, with a productive capacity of not less than 1,000,000 tons and specializing in the products in greatest demand.

IRON AND STEEL INSTITUTES AND RESEARCH LABORATORIES

The vast programme of reconstruction and consolidation undertaken and gradually completed by the Italian iron and steel industry in the post-war years could not have failed to include a considerable stimulus to all research activities associated with the iron and steel sector of industry. A great industry like iron and steel, in order to develop and expand in full competition with the most experienced industries of other countries, must be able to count on able and up-to-date technicians, must be able to keep abreast of the most recent technical developments, and must be in a position to introduce all the necessary improvements in production processes.

All this can only be assured by means of a well-prepared research programme undertaken by scholars and specialist experimenters supplied with adequate equipment. In this field Italy has always been in a precarious position compared with other technically advanced countries. Although there has always been a tradition of scientific research in Italian universities, it was not very developed, even if the applied research characteristics of modern industry which, setting out from basic theoretical ideas formulated in university laboratories and institutes, then makes use of technological experience in close association with the requirements of the work in hand, was not altogether lacking.

In the past the industry had been largely dependent on foreign sources as far as technical innovations were concerned. Therefore the Italian iron and steel industry's reconstruction and modernization programme had to include the improvement of research facilities and, above all, the training of specialist personnel. This need was understood by the largest Italian iron and steel group—the Finsider—and in particular by its first post-war president, Engineer O. Sinigaglia, who decided to found an appropriate institute in which research and the professional training of specialists would be developed in due proportion and harmony, and thus assure to the companies of the group both personnel of high quality and continuous technical progress.

Finsider Iron and Steel Institute

Thus in 1948, at Genoa-Cornigliano, the Finsider Iron and Steel Institute was established as a central organization of the Finsider group, and this has been from its very foundation the means whereby the member firms of the group have taken care of the selection and training of young graduate technicians to be introduced into the management. At the same time an information and technical publications assistance service was developed, and by means of research subjects and projects technical and scientific problems were studied in collaboration with the personnel of the member firms.

Today the FISI is equipped with the following services:—(1) Training and investigation of personnel; (2) metallurgical research; (3) library service; (4) production and installation of measuring and control instruments.

The "Training and Investigation of Personnel" service fulfils one of the principal aims of the institute, the professional improvement of the specialists of the firms belonging to the group. This work is done in two ways: in the first place by the selection and professional training of recent graduates and holders of diplomas who are continuously joining the firms of the group, and secondly by means of special refresher courses for the technical staff of the firms themselves.

In a little over 10 years more than 15,000 young graduates have been selected by their qualifications or through examinations, and more than 600 of these have been passed on to member firms of the group after serving an appropriate apprenticeship. Some of these have already risen to managerial positions, and many are already established as departmental heads in their respective firms.

Several specialized courses at various levels—for example, courses on operational research, safety precautions, and production practices—have been held for the technical personnel of the member firms. In addition numerous firms and companies not belonging to the Finsider group, including the State Railways, have asked for the services and assistance of the institute's training department.

Research development includes both laboratory and workshop activities designed to reduce the cost of production, to improve the quality of products, and to study new methods of production. A basic characteristic of the Finsider Iron and Steel Institute is the fact that it does not possess its own

laboratory; this arrangement was decided upon at the time of the institute's foundation with the special aim of economizing investment, as was necessary immediately after the war. It was accordingly planned to stake as much as possible on the formation of a body of young research workers of high quality and on a very extensive and up-to-date library.

For experimental work the laboratory facilities of individual members of the group were used when the occasion demanded, and *ad hoc* establishments for pilot research were developed in the most suitable localities. This arrangement, which was born essentially under the pressure of a severe curtailment in expenditure, has turned out to be efficient and rich in practical results. Typical of these research activities is the close collaboration between factory technicians and professional research workers from the institute; a great deal of research is, in fact done in the works themselves, where factory technicians work alongside professional research workers freed from the responsibilities of production. Works laboratories and the institute's laboratory instrument workshop are used for making the necessary measurements for research.

For the development of research projects *ad hoc* committees of research workers from the institute and workshop technicians are frequently set up, and these examine and discuss the research proposals that have emerged from the requirements of group members. Much research and systematic testing is carried out directly on production machinery.

A number of research projects in all sectors of the iron and steel industry have been developed: examples are the preparation and treatment of ores, coke plant, blast furnaces, steel plant, foundries, ingot moulds, rolling processes, heat treatment, refractories, and general heat conservation. A number of research projects have also been carried out on new processes such as direct reduction, roasting, sintering, and pelletization. There has also been much activity in the fields of operational research, statistical quality control, and organization.

The library service includes an extensive library of over 15,000 volumes and at least 400 technical journals, and a large number of microfilms, photocopies, and translations. All this material is assessed and provisionally catalogued by the international ASM-SLA system of classification, which was introduced and extended in Italy, and more recently in Europe, by the Finsider Institute. Thus, the entire personnel of the firms of the Finsider group has an extensive technical library at its disposal.

The Finsider Institute has also built a laboratory apparatus workshop equipped for the construction and installation of workshop measuring and control apparatus. It is also making research apparatus for the measurement of temperature, range, pressure, and other phenomena along the same lines. Altogether it can be said that today the Finsider Institute is solidly established even in international research circles such as OEEC and ECSC.

The Breda Institute

Founded in 1917, the Ernesto Breda Scientific Institute at the Breda Works in Milan was for many years the only large research laboratory available to the Italian iron industry. According to its initial programme it was to serve a variety of purposes, from purely scientific research to technical scientific research applied to particular phases of the productive process, the checking of raw materials and the testing of finished products. In 1951 it was decided to grant the institute complete administrative as well as scientific and technical autonomy by creating a company, the Breda Research Institute Limited, for the purpose of undertaking research on behalf of third parties.

In organization it is divided into two main divisions—a research division and a testing division. The services of the research division are available to anyone who wants to carry out studies and research in given industrial fields. The testing division carries out examinations, experiments, and trial runs, and supplies a certificate bearing the date and information ascertained. Fields in which the Breda Institute is active include:—General and specialized chemical analysis; ore treatment; metallography; mechanical testing, tensiometry; thermal treatment; Röntgenography; non-destructive testing; radioisotopes; corrosion; foundry practice, and refractories.

To this must be added a well-equipped mechanical workshop and an extensive library of over 5,000 volumes and more than 150 technical journals, both Italian and foreign.

The activities of the Breda Institute are evidenced by more than 220 memoranda published in technical journals and by several thousand unpublished reports containing the results of specific research carried out on behalf of industrial concerns, private individuals, and Government bodies.

Other Research and Testing Laboratories

Every Italian iron and steel firm, of course, has its own laboratory in which to carry out the analyses and tests required by the work in hand. These are generally standard laboratories in which only analyses and tests of a routine character are carried out, and not research in the true sense of the word. The larger industrial concerns, however, possess central laboratories in which are carried out studies and research aiming at improving production. In recent years these have been particularly well equipped and improved, and have done some very useful research in the field covered by the work of their respective firms. Firms belonging to the Finsider group itself (*e.g.*, Cornigliano, SIAC, Dalmine) possess central laboratories which are making a notable contribution towards perfecting production. Among other firms should be mentioned the central laboratories of Cogne, FALCK, and FIAT.

The Società Nazionale Cogne has at its works at Aosta three laboratories grouped under the title of central laboratory, and one director, and these are entrusted with the task of checking, by means of experiments and tests, the normal production of mines and factories, while at the same time displaying considerable activity in the field of applied research. It is estimated that one third of the laboratory work is dedicated to research and two thirds to testing.

The three sections of the central laboratory are:—(*a*) Study and testing laboratory; (*b*) chemical laboratory; (*c*) ore treatment laboratory.

The latest work carried out or in progress at the central laboratory of the Società Cogne is concerned with research on the operation of blast furnaces, the study of blast-furnace slag, studies on the non-metallic inclusions in iron products, research into solidification, and research into the reduction of magnetites. There is also in operation a pilot plant for the vacuum process casting of large forge ingots.

The Accieierie Ferriere Lombarde, FALCK, S.p.A., has at its works at Sesto S. Giovanni, a research and testing centre. This is the firm's organization dedicated to studies and applied research in the iron and steel field, with particular emphasis on the determination, perfection, and testing of production cycles and of the metallurgical fabrication processes throughout the group. In performing its duties it acts in collaboration with all existing metallurgical services of the various companies.

The research and testing centre is subdivided into various sections:—Chemical analysis; metallographic section; physical tests; mechanical tests; heat treatment, and workshop. A library service is now also attached. Recently various research projects have been executed in the field of the structure, characteristics, and properties of steels, methods of treatment, and coatings.

The Società FIAT has, at its Ferriere di Torino branch, a study and research service engaged on analyses, testing, and research specifically in the iron and steel sector. This service is, of course, mainly concerned with controlling production, but it is also engaged on technical research in close collaboration with the metallurgical services of the firm's factories. Various works published over the last few years on the characteristics, properties, and behaviour of steels under various treatments bear witness to the activity displayed.

Census of Research Expenditure

In 1956 and 1958 a census of research expenditure in the Italian iron and steel industry was made at the instigation of OEEC. Replies were received from numerous firms, both medium and large. Although it is extremely difficult to separate expenditure on the normal operation testing and the corresponding laboratories from expenditure and scientific research in their true meanings, the data collected clearly reflect the Italian industry's growing interest in research work and the big effort that has been made to equip laboratories and their corresponding institutes in accordance with the requirements of modern industry.

It is estimated that 1,000,000,000 lire is spent on iron and steel research in Italy per annum, and 70 per cent. of this sum is accounted for by the Finsider group.

WORK WITHIN THE RESEARCH COMMITTEE OF THE ECSC HIGH AUTHORITY

The Italian iron and steel industry takes an active part in the research carried out under the auspices of the High Authority and co-ordinated by the Technical Research Committee of ECSC for improving iron and steel products and especially for reducing specific consumption of raw materials. Italian participation has been particularly active in the field of reducing iron ore and especially in direct reduction.

In 1958 the Finsider Institute presented to the appropriate ECSC research committee a project for a new process of direct reduction in a shaft furnace. The ECSC research committee, considering the Finsider process to be a very important step in the basic research in the field of reducing iron ores, gave the Finsider Institute its mandate to proceed with the experiment on behalf of the Community. On September 2, 1958, the Council of Ministers of the ECSC countries sanctioned the allocation of $1,000,000 for the construction of a pilot plant along the lines suggested in the Finsider process.

This plant, to be built at the headquarters of the Finsider Institute at Genoa, will be capable of producing 20 tons of sponge iron per day. This will provide data on the technological characteristics of the process, on the kinetics of reactions on the industrial scale, and design data for a big production unit.

Another item of international research in progress within the ECSC sphere in which Italian participation has been particularly active is the metallographic atlas. It was, in fact, at the suggestion of the Finsider Institute that the decision was taken to compile a metallographic atlas which would bring up to date the few published works in existence on the subject, which are now out of print. This involves making a collection of micrographs of the structure of ferrous metals by optical or electronic means, accompanied by a detailed commentary.

This work is intended to supply practising technicians, students, and scholars alike with a complete picture of the structures of various types of steel differently treated. It will be particularly useful in the teaching of metallography in iron and steel laboratories and research institutes. The High Authority of ECSC has sanctioned the appropriation of $200,000 for the completion of this atlas.

TECHNICAL RESEARCH BY ASSIDER

The steps taken by the industry in the field of scientific and technical research have been fol-

lowed and supported by the Italian Iron and Steel Association ASSIDER, which includes most Italian iron and steel concerns, both State and privately owned. This acts as a co-ordinating body between the various concerns in this field as well, and has recently taken directly upon itself the financial burden of several research schemes of common interest carried out jointly by various companies.

The Technical Research Sub-commission of ASSIDER has decided to begin several co-operative research projects and has approved their financing. The three co-operative research projects already in progress are:—

PROJECT No. 1.—Improvement of regenerators used in Siemens-Martin furnaces. Proposed and executed by the Finsider Institute, this will comprise the examination, by means of scale model tests, of the possibility of perfecting the operation of brick checker-work systems designed on the basis of some constructive ideas developed on theoretical considerations.

PROJECT No. 2.—The influence of certain residual elements on the characteristics of steel. Proposed and executed by the FIAT Company, the purpose of this research project is to determine the influence of certain noxious elements present in above-average concentrations on the characteristics of cold stamping and hot shaping of the steels. The project provides for the special re-smelting of extra-soft steel with the addition of contaminating substances and the ensuing rolling into sheets and tubes, with mechanical and technological analysis and testing at every stage of transformation.

PROJECT No. 3.—The use of radioisotopes for the study of segregations and micro-segregations. Proposed and executed by the Breda Institute, this project provides for the use of radioactive indicators in the metallographic analysis of steels, and in particular for the study of segregations.

By supporting these projects, ASSIDER intended first and foremost to set an example and provide an incentive so that research should be continued and maintained by Italian industry, and so that the more expensive projects could be completed on a co-operative basis.

The situation with regard to research in the Italian iron and steel industry, outlined here in schematic form, shows considerable points of progress compared with the past, and confirms that also in Italy applied research is looked upon as the most important method of improving production and reducing costs, an idea that, after meeting initial difficulties, is definitely here to stay.

Metallurgical Patents in the US

DESCRIPTIONS of metallurgical patents given below have been taken from details given in the Official Gazette of the United States Patent Office.

Precision Casting

A method of manufacturing a mould for casting metals comprises forming an expendable pattern, coating it with an initial refractory coating, investing the coated pattern with refractory material which is moistened with an aqueous solution of a silicate of a metal selected from the group consisting of potassium and sodium, the solution forming only a small percentage of the mixture. A refractory mould structure is formed therefrom, being hardened by the action of carbon dioxide. To the hardened refractory structure a non-aqueous solution of at least one thermosetting resin is applied and hardened by application of heat—2,930,089.

Electrically Operated Stove Changing Control Apparatus for Blast Furnaces

A hot-blast stove for a blast furnace, is equipped with a hot-blast valve, a cold-blast valve, at least one chimney valve, a burner shut-off valve, and a gas shut-off valve. Electrically controlled mechanisms associated with each of the valves for actuating them place the stove in a plurality of operating conditions including "on gas" and "on blast" or manually controlled means associated with the stove selectively place it in any one of the plurality operating conditions. Interlocked electrical controlled means are provided for operating each of the mechanisms in sequential relation whereby the valves of the stove are automatically operated in predetermined sequence with the operation of the hot-blast valve being at one extreme of the sequence and the operation of the gas shut-off valve being at the other extreme of the sequence of operation in direct response to a single operation of the manual control whereby a single manual operation automatically changes the stove from one operating condition to another.—2,931,635.

Open-hearth Furnace Construction

An open-hearth furnace includes a hearth adapted to support molten metal, side walls extending upwardly from the hearth and converging over the hearth, and a roof having oppositely sloping sections above the hearth, the sections being directed outward and downward toward the side walls, the lower ends terminating inside the walls at clearance gaps formed by the ends with the inside surfaces of the walls. The side walls and roof are of basic refractory brick, and the furnace has a maximum width between side walls at or just above the hearth and about 10 per cent. greater than the width of the roof measured across the inner face of the roof. Supports extend upwardly and inwardly outside the side walls, horizontal first beams generally extending along the tops of the supports. Means to connect the basic refractory brick of the side walls with the supports, second beams sloping outwardly and downwardly in opposite directions across the furnace above the oppositely sloping sections of the roof, the second beams having their lower ends supported by the first beams to transmit the load of the roof to the supports. Hangers connect the individual basic refractory brick of the roof with the beams, and abutments on the lower ends of the the beams, spaced from the inside surface of the side walls and extending downwardly over the outsides of the sidemost brick in the section of the roof.—2,930,601.

New Equipment to Mark 70th Anniversary

SEVENTIETH anniversary of E. P. Allam & Company, Limited, London, S.W.1, has been marked by the introduction of a variable frequency vibrator and alternator and a completely new type of vibrating roller in small, medium, and tandem models for compacting roadmaking and other materials. The company is, of course, well known for its electric vibrators, which find industrial application in the fields of screening, mechanical handling, and compacting.

The variable frequency vibrator provides a simple means of varying the frequency of vibration of screens and so ensures efficient screening, because, as is well known, different materials respond to different frequencies. The alternator is coupled to a variable speed motor, the output frequency of which can be varied from 25 c.p.s. up to 75 c.p.s. by a hand wheel while maintaining the voltage increase in direct step with frequency increase, an essential in induction motors.

By mounting two of these vibrators in contra rotation on to conveyors, feeders, or screens the flow can be easily regulated to suit the material to be handled, with a minimum of current consumption. Only fixed frequency vibrators of 1,500 and 3,000 r.p.m. have been available previously.

Screening Conveyor

The company's screening conveyor is a further example of the development of vibration; here a rotary movement is converted into an elliptical motion, imparting a directional movement on the material handled and thus screening and conveying along a horizontal plane. This principle provides correct screening of fine particles, with the economy of a single low h.p. electric vibrating motor.

A unique feature of the vibrating rollers made by the firm is that a totally enclosed vibrating motor is mounted inside the roller with a small three-phase alternator set. The smallest model is hand-propelled and has an output force equivalent to a 25-cwt. roller.

The tractor-driven medium-size roller is automatically propelled by a motor driven from the alternator set with a forward, reverse, or stop, operated from a simple switch. Vibration is provided by two standard contra-rotating electric vibrating motors mounted inside the rollers, their forces combining in the vertical plane, thus providing maximum concentration of force on the material to be compacted. As with the small roller, the electric vibrators are driven from a small alternating set, mounted above the roller, the output of which can be used for other purposes when not required for rolling. The output force is equivalent to a 2½-ton roller.

The tandem rollers are similar in design to the medium roller (in fact, they are interchangeable) and include two standard contra-rotating electric vibrating motors. They can comprise two, three, or four rollers coupled together, according to the width required to be compacted. The alternator is mounted inside the tractor and coupled to the tractor engine, and the speed and frequency ratio between the engine and the alternator are such that faster vibrating frequencies can be obtained if necessary. Each single roller is thus equivalent to a 3-ton roller.

The tractor itself is a machine of standard manufacture, fitted with a larger engine to provide capacity for the alternator; it is available with tracks or tyred wheels. When not required for vibrating it can be used as a light-weight grader, dozer, or for back filling, and a variety of standard attachments are available. Alternatively, the alternating set can be used for power tools, lighting, etc.

New Names for Some Wiggin Alloys

NEW names for certain of its high nickel alloys are announced by Henry Wiggin & Company, Limited, London, S.W.1. The re-naming has become necessary because of the wide diversity of compositions which have been developed over the last few years to meet specific material requirements.

INCOLOY DS is the new name for the alloy previously known as NIMONIC DS. This is essentially a nickel-chromium-iron alloy, useful in oxidizing conditions at temperatures up to 950 deg. C. In reducing atmospheres, INCOLOY DS may sometimes be used at even higher temperatures. It is particularly resistant to attack from the carbonaceous atmospheres encountered in some types of bright annealing equipment and has good resistance to "green-rot." Originally developed for wire-woven conveyor belts for furnaces, INCOLOY DS is increasingly used for furnace parts and a wide range of other high-temperature equipment.

VALRAY 1 is the new name for BAC BRIGHT-RAY, an 80/20 nickel-chromium alloy used extensively for the coating of automobile exhaust valves. Throughout the last war, most aircraft engine exhaust valves were surfaced with this alloy, which was also widely used in the reclamation of exhaust valves in heavy vehicles. This experience has been extended with the result that, in addition to their continued use for aero-engine exhaust valves, VALRAY-coated valves are used exclusively by the Rover Company, Limited, and to an increasing degree by other motor-car manufacturers and fleet owners in the UK and oversea. Their use in diesel engines, especially those running on heavy fuels, is increasing rapidly.

PRODUCTION OF bituminous coal and lignite in the US during April, according to the Bureau of Mines, US Department of the Interior, was 34,685,000 net tons, compared with 38,200,000 net tons in the previous month and 34,931,000 net tons in April, 1959.

To gain better control of end-point temperatures at the works of the Jones & Laughlin Steel Corporation operating the basic oxygen (LD) process, a set of mathematical equations was developed, being the outcome of a thermochemical analysis of the process designed to calculate the required scrap, lime, and hot metal additions in terms of a number of independent variables. Details of the process were given by W. J. Slatosky, a research physicist of the corporation, in a paper presented at the 1960 annual meeting of the American Institute of Metallurgical Engineers. The technique is outlined below.

THE LD STEELMAKING PROCESS

End-point Temperature Control

BY charging a converter with additions that are thermally balanced, the autogeneous nature of the basic oxygen (LD) steelmaking process makes it possible to control bath temperatures without an external fuel supply. The thermal requirements of the charge materials are such that, during the refining process, they throttle the heat generated by the metallurgical reactions in a manner resulting in a specified temperature at the completion of the heat.

At the basic oxygen furnace plant of the Jones & Laughlin works, operators initially relied on their experience and technical knowledge of the process to determine the quantities of charge additions needed to obtain a finishing temperature in the range of 1,580 to 1,600 deg. C., the charge consisting of 93 tons of scrap and hot metal plus an amount of lime sufficient to maintain a basicity ratio of 2.8 to 3.2. Estimates of these materials are based on a consideration of the effects on finishing temperature of (1) iron silicon content, ranging from 0.8 to 1.8 per cent.; (2) iron temperature, ranging from 1,240 to 1,400 deg. C., and (3) any excessive cooling of the furnace caused by a production delay.

Adjustments Needed

If the end temperature of the preceding heat was within the specified temperature range, the succeeding heat could be charged with materials of nearly the same proportions, provided the hot metal in each case was of approximately the same temperature and composition. Because of the complex thermochemical behaviour of the process and the inexact and subjective nature of the method of determining charge additions, precise temperature control is impossible. Heats, therefore, outside the specified tapping range necessitated subsequent adjustments by either re-blowing the cold heats so as to raise the bath temperature to the desired level, or cooling hot heats with scrap.

To improve temperature control, an analysis of the thermochemistry of the process was undertaken, which led to the development of a set of mathematical equations for calculating the quantities of scrap, lime, and hot metal needed to attain the specified tapping temperature range. The analysis is not a repetition of work done by others, but rather an extension with a view to charge additions being calculated, not in terms of silicon only, but as a function of all independent variables. The paper presents the derivation of these relationships, a method of utilizing them on an operational basis, and illustrates their effectiveness in controlling bath temperatures.

Heat Balance

The first step in analyzing the problem was the enumeration of the chief variables, which were separated into the following three categories:—(1) Important variables; (2) variables considered as constants; and (3) variables to be neglected (Table 1). The breakdown is an arbitrary one, designed to facilitate the analysis; otherwise, the mathematical treatment would have been exceedingly cumbersome and complex. Experience has shown that these simplifying assumptions do not seriously impair the accuracy of the calculations. These variables along with the limiting assumptions listed in Table 1, were then used to write a heat

TABLE 1.—*Thermodynamic Variables of the Basic Oxygen Steelmaking Process.*

Major Variables:
Iron chemistry (C, Si, and Mn)
Iron temp.
Wt. of slag constituents at turn-down (MnO, CaO, SiO_2, and total FeO)
Wt. of charge
" " scrap
" " hot metal
" " mill scale
" " ore pellets
" " drain outs
Delay times
Lance height above bath
Basicity ratio
Variables considered as Constants:
Blowing time (relatively constant for a given oxygen flow rate, turn-down carbon level, and weight of charge)
End-point chemistry (C, Si, Mn, P, and Ti)
Iron chemistry (P and Ti)
Fume losses
Ratio of CO and CO_2 formed in the bath
Slag constituents (TiO_2 and P_2O_5)
Heat lost through the furnace lining
Variables to be Neglected:
Scrap size
Scrap chemistry
Quantity and chemistry of iron slag
Age of the furnace lining
Slag Constituents (MgO and Al_2O_3)
Condition of the furnace lining
Wt. of fluorspar

balance for the process by applying the equation of continuity:—

Rate of increase	=	Rate of income	−	Rate of outgo
of heat		of heat		of heat

The method of expressing the heat balance in the form of rate equation springs from a dynamic analysis undertaken on the Jones & Laughlin analogue computer, in which differential equations were used to define completely the transient behaviour of the variables. Computer calculations demonstrated that the rate equation could be integrated to yield finishing temperatures that compared well with measured values. It was also determined that by transforming the integrated expression and supplementing it with several other relationships, calculations could be made for obtaining thermally balanced charge additions.

Rather than begin using these expressions immediately to control furnace charges, it was decided that it would be wiser to work alongside operating personnel and predict end-point temperatures, thus enabling them to gain confidence in the mathematical model, and, at the same time, permitting refinements to be made in the equations. After a suitable practice period, the transformed relationships could then be used to test-control the process.

The derived end-point temperature (T) equation is based on the following parameters:—T_F is the end-point temp.; W_{HM}, wt. of hot metal (lb.); T_M, measured Fe temp.; Si_o, measured Fe Si (per cent.); Mn_o, measured Fe Mn (per cent.); W_S, wt. of scrap (lb.); W_{CaO}, wt. of lime (lb.); V.V, basicity ratio (dimensionless); L.H., lance height (in.); W_{MS}, wt. of mill scale (lb.); W_p, wt. of ore pellets (lb.).

A set of computed values is presented in Table 2 to illustrate the effects that certain changes in these parameters have on end-point temperature.

TABLE 2.—*Effects of Changes in the Independent Process Variables on End-point Temperatures.*

Variable.	Amount of charge.	Effect on end-point temp., deg. F.
Si	0.10 pct.	36
W_{HM}	1,000 lb.	7
T_M	100 deg. F.	62
Mn	0.10 pct.	8
W_S	1,000 lb.	12.5
V.V.	0.1	4
W_{MS} or W_P	1,000 lb.	32
$WCaO$	1,000 lb.	23
L.H.	10 in.	4

(NOTE.—Calculations were made on the basis of a charge consisting of 58,000 lb. of scrap, 128,000 lb. of hot metal, and 13,000 lb. of lime.)

Mill trials demonstrate that improved temperature control with the use of the mathematical equations is feasible. However, adjustments are still required 35 per cent. of the time. Numerous reasons can be advanced to explain the occurrence of off-temperatures, a list of the more significant of these being given in Table 3. It is believed that the temperature performance level can be raised considerably by exerting greater control over some of these anomalous conditions, *i.e.*, by having a more powerful fan for removing smoke from the iron reladling stream, by taking iron samples from the mixer ladle to obtain a better analysis, and by effecting better control of oxygen input time.

TABLE 3.—*Causes of Off-temperature Heats.*

Erroneous Fe temp. measurements (caused by smoke)
Non-representative chemical analyses.
Excessive slag volume caused by erratic lancing conditions.
Excess oxygen or lance time.
Use of pit scrap.
Long delays.
New furnace lining.
Computational error.
Error in the mathematical model.
Error in weighing additions.
Unmelted scrap at completion of the heat.

Results of test heats demonstrate that a set of mathematical equations derived from thermochemical principles can be used to calculate thermally balanced charges. Using controlled charges, a greater percentage of heats can be turned-down within a specified tapping temperature range than is otherwise possible. Much effort must be expended, however, before computer techniques to control the process have been fully developed; indeed, the work has only begun. But the future can well expect to see this instrument being used for the calculation of blowing times and, consequently, the control of steel chemistry as well as temperature control.

Forthcoming Events

JUNE 13-17

Association of Mining Electrical and Mechanical Engineers: Annual convention in Blackpool.

JUNE 15

Midland Counties Institution of Engineers:—Visit to the works of the Parsons Chain Company, Limited, Stourport-on-Severn (Worcs).

JUNE 29—JULY 1

Institution of Mining Engineers: Summer meeting in Cardiff. "The Degradation of Coal in Power Loading," by G. V. Standerline and Dr. S. Islwyn Evans, and "Pulmonary Disability Among Coal Miners, with Special Reference to the Pneumoconiosis Field Research," by John M. Rogan.

JULY 25

Institute of Metals: Meeting at the Royal Institution, Albemarle Street, London, W.1, at 6.30 p.m. "The Structure of Metals and Intermetallic Compounds," by Prof. Linus Pauling, of the California Institute of Technology.

A Special Issue on Zinc

A separate review number of the Metal Bulletin devoted to the zinc industry has recently been published. Interesting articles and useful maps and illustrations are contained in the issue, which extends to over 100 pages. Copies (10s., post free) may be obtained from Birkett House, 27, Albemarle Street, London, W.1.

Ownership of New Finnish Ironworks

Reports in the Swedish Press state that half of the share capital of 1,000,000,000 Finnish marks of a new ironworks which is to be built at Hangö, in Finland, will be contributed by Stora Kopparbergs Bergslags AB, the large Swedish steel and timber group, and the other half by the Finnish company Vouksenniska AB. This works is scheduled for completion in the autumn of 1961. It will have an annual capacity of 250,000 tons of pig-iron.

British Iron and Steel Industry Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on application, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1458: "Contributions to Steelworks Chemistry Sampling and Determination of Hydrogen in Steel." A. STETTER. Stahl u. Eisen, 1959, July, 23, pp. 1087-1090. £2 10s.

1541: "Non-oxidizing Heating of Steel in Open-flame Furnaces." V. A. KUROEDOV. Kuznechno-shtampovochnoe Proizv., 1959, Jan., pp. 25-31. £6 10s.

1550: "Development of Drives and Electrical Machines in Rolling Mills." W. NÜRNBERG. Stahl u. Eisen, 1959, May 14, pp. 694-703. £7 10s.

1563: "Critical Study of the Determination of Hydrogen in Steel." J. CALMETTES, *et al.* Mem.Sci.Rev. Met., 1959, Dec., pp. 641-655. £7 10s.

1578: "The Employment of an Electric Integrator for the Study of the Temperature Distribution of the Hearth and Foundation of a Blast Furnace." V. V. YUSHKIN. Stal, 1957, Sept., pp. 779-787. £5 10s.

1608: "The Problem of Pinhole Porosity in Steel Castings." R. WLODAWER. Giesserei, 1960, Jan. 14, pp. 1-7. £5 5s.

1614, 1616, 1618: Papers from "Continuous Casting of Steel. Proc. 1st All-Union Conference, October 17-19, 1955." Moscow, Akad.Nauk, 1956.

1614: "Peculiarities (and Defects) of the Formation of Billets Produced by Continuous Casting." O. D. ZIGEL. pp. 164-177. £5 15s.

1616: "An Investigation of the Mechanical Properties of Steel During Solidification and an Analysis of the Process of the Formation of Hot Cracks During Continuous Casting." L. M. POSTNOV and B. B. GULYAEV. pp. 212-222. £6.

1618: "On Planning Scientific Investigations on the Continuous Casting Process." A. M. SAMARIN. pp. 267-270. £2 15s.

1640: "Research into the Flow Pattern of Combustion Gases in, and the Heating of, Soaking Pits by Means of Models." S. CERNOCH, *et al.* Hutnik (Prague), 1960 (1), pp. 21-24. £5 10s.

1648: "Cementing of Steel with Plastic Adhesives." K. MÖHLER. VDIZ, 1959, Jan., pp. 1-8. £6.

1657: "Reducing Segregation in Rimming Steel. I—Blowing Oxygen into Ingots." SHAO Hsiang-hua and PANG Yueh-chu. Acta Met.Sinica, 1958 (2), pp. 98-109. £9.

1658: "Effect of Low Temperatures on the Strength of 11 Plain Carbon Steels (up to 0.12 per cent. C) under bi-axial Stressing." A. KRISCH. Arch. Eisenhüt., 1960, Jan., pp. 19-24. £3 15s.

1662: "The Most Common Types of Corrosion in Stainless Steels." S. BERG. Chemische Rundschau, 1959, Apr. 1, Beilage 2, pp. 185-189. £4 10s.

1681: "Investigations on the Effect of the Rolling Conditions on the Properties of Hot-rolled Low-carbon Steel Strip. I—Structure of the Scale and Behaviour in Pickling." W. DAHL and W. LUEG. Stahl u. Eisen, 1958, Mar. 20, pp. 368-377, and CDS Circ. d'Inform Tech., 1958 (8), pp. 1601-1622. £6 10s.

1688: "The Rotor Steelworks of Ilseder Hütte." W. KÖHLER. Klepziq Fachberichte, pp. 341-343. £2 15s.

1689: "Graphical Method for Determining Forces and Power Requirements in Drawing Bars and Tubes." H. MÄKELT. Industrie-Anzeiger, 1959, May 19, pp. 28-31. £3.

1384: "Processes of Forming Metal under Pressure in the Liquid and Plastic State and their Developmen." V. M. PLYATSKII. Lit.Proizv., 1956 (6), pp. 7-11. £5 15s.

1493: "The Production of Power and Blast in the Top Gas Power Plant of an Iron and Steelworks by Means of a 14-MW Gas Turbine." A. WEYEL, *et al.* Stahl u. Eisen, 1959, Oct. 15, pp. 1471-1478. £6 5s.

1512: "Pressure-welded Austenitic-ferritic Composite Junction Pieces (Mannesmann-type Joints)." H. LINDEN and H. HENNECKE. VGB Mitt., 1958, June, pp. 165-175. £5 15s.

1553: "Conchoidal Fractures in Nickel-vanadium Steel." Z. D. EMINGER. Neue Hutte, 1959, Oct., pp. 596-608. £5 15s.

1568: "The Effect of Niobium on the High-temperature Properties of Austenitic Stainless Steel." S. INOUE, *et al.* Tetsu to Hagane, 1958, Sept., pp. 1132-1134. £4 5s.

1622: "Welded and Expanded Joints for High-pressure Pre-heaters." H. HAFERKAMP. VGB Mitt., 1959, Oct., pp. 365-367. £2 15s.

1634: "The Effect of an Increased Iron Sulphate Content in Sulphuric Acid Pickling Solutions on the Technological Properties of Pickled Wires." C. EISENHUTH and M. MARTIN. Stahl u. Eisen, 1959, Dec. 10, pp. 1862-1867. £4 5s.

1639: "Contribution to the Complete Determination of the State of Residual Stresses in Hollow Cylinders." P. LAURENT, *et al.* Forsch. Ing., 1959, vol. 25 (2), pp. 44-54. £5 15s.

1680: "Forces Operating in Cold Roll Forming." V. I. DAVYDOV and YU.K. PUZYREVSKII. Stal Rolling and Tube Manf. Supp., 1959, pp. 95-103. £4.

1682: "Heat Migration Through the Outer Metal Oxide Layer During the Dissociation of Lumpy Carbonates." G. BALAZSOVICS. Radex Rund., 1959, Dec., pp. 714-721. £3 15s.

1719: "Contribution Towards the Knowledge of the Behaviour of Hydrogen in Steel." W. HOFMANN and G. VIBRANS. Mem.Sci. Rev.Met., 1960, Feb., pp. 88-90. £2.

1721: "Determination of Cubic Chromium Carbide $Cr_{23}C6$ in Steel." N. M. POPOVA and K. P. SOROKINA. Zavods. Lab., 1953 (9), pp. 1033-4. £1 10s.

Developments in Foundry Practice

A refresher course on Developments in Foundry Practice is announced by the metallurgy department of Battersea College of Technology. It will be held from July 19 to 22 and will be conducted by a panel of visiting specialists from the foundry industry. The course has been designed to survey the progress and developments in both processes and equipment on a wide front, and to indicate the possible significance of these developments. There will be ample time for discussion of the various topics and it is hoped to arrange some suitable visits to foundries. The fee (inclusive of luncheon, morning and afternoon refreshment, and visits, will be £12 12s. Enrolment forms and further information may be obtained from the Secretary (Metallurgy Courses), Battersea College of Technology, London, S.W.11.

New Patents

PATENTS below are among the complete specifications accepted listed in the Official Journal (Patents). The numbers given are those under which the specifications have been printed and all subsequent proceedings will be taken.

Applications for copies of the full specifications (3s. 6d. each, post free) should be made to the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

Mining and Mining Appliances

831,565 SAARBERGWERKE. Metallic extension bars used for roof supports in mines.

831,567 MINING ENGINEERING COMPANY, LIMITED. Idlers for steel band conveyors.

831,360 STAHLWERKE BRUNINGHAUS G.m.b.H. Apparatus for winning coal and other minerals.

831,711 GEWERKSCHAFT EISENHÜTTE WESTFALIA. Bracing arrangement for a stripping-action scraper installation for use in coal or other mines.

831,718 GEWERKSCHAFT EISENHÜTTE WESTFALIA. Anchoring device for a plough installation in semi-steep measures in coal mining.

831,956 MASCHINENFABRIK R. HAUSHERR & SOHNE G.m.b.H. Operating system for mine haulage.

832,367 BRITISH THOMSON-HOUSTON COMPANY, LIMITED. Winding and haulage equipment.

831,893 HAYDEN-NILOS, LIMITED. Belt-fastening machines.

831,830 SMITH, H. M. N., and JONES, H. Miners' flame safety lamps.

832,499 DOBSON, LIMITED, W. E. & F. Roof supports for underground mines.

832,794 SANDVIKENS JERNVERKS A.B. Rock drill cutting insert of sintered hard metal.

832,838 BARKER & SON ENGINEERS, LIMITED, W. H. Apparatus for loading mine skips.

833,365 MINING ENGINEERING COMPANY, LIMITED. Chain drives.

833,063 HAYDEN-NILOS, LIMITED. Belt-fastening machines.

833,532 BRITISH THOMSON-HOUSTON COMPANY, LIMITED. Electric winding and haulage equipment.

833,692 EGGEMANN, W., and CAMPENHAUSEN, VON E., [trading as SCHWARTZ KOMM.-GES., H.]. Props including pitprops.

Metallurgy and Engineering

831,305 ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED. Refining of heavy metals by zone melting.

831,528 FONDERITE SOC. A R.L. Process for casting steel ingots without producing shrinkage cracks.

831,781 CERVASEK, J., and OTAHAL, V. Process for the manufacture of ductile cast iron.

831,505 SANDVIKENS JERNVERKS A.B. Backed rolling mill.

831,285 PHOENIX-RHEINROHR AKTIENGESELLSCHAFT VEREINIGTE HÜTTEN- UND RÖHRENWERKE. Process for the continuous production of longitudinally welded steel tubes.

831,728 ARMCO INTERNATIONAL CORPORATION. Stainless steel.

831,372 ARMCO INTERNATIONAL CORPORATION. Austenitic alloy steels.

832,382 STEIN & ATKINSON, LIMITED. (Christiania Spigerverk). Electric soaking pits.

831,887 GERAETEBAU-ANSTALT. Vacuum melting and casting plants.

832,384 NEWMAN, L. L. Method of and apparatus for manufacturing iron.

832,280 HAYMAN, J. C. Refractory nozzle for use in teeming molten steel.

831,858 UNITED STATES STEEL CORPORATION. Open-hearth steelmaking process.

832,323 BRITISH IRON AND STEEL RESEARCH ASSOCIATION (Centre National de Recherches Metallurgiques). Continuous casting.

832,329 SCHLOEMANN A.G. Means for regulating the individual drives of roll housings in a continuous rolling-mill train.

832,642 STEIN & ATKINSON, LIMITED. Electric soaking pit or furnace.

832,562 ALLEGHENY LUDLUM STEEL CORPORATION. Heat treatment of stainless steel.

832,403 ROLLS-ROYCE, LIMITED. Nitriding ferrous articles.

832,579 MEEHANITE METAL CORPORATION. Ferrous alloys.

832,438 GENERAL ELECTRIC COMPANY. Process for producing silicon-iron alloy sheets.

832,439 NISHIKIORI, S. Steel ingot making method and apparatus.

832,666 GENERAL MOTORS CORPORATION. Ferrous metal and methods of producing same.

833,236 SANDVIKENS JERNVERKS A.B. Sintered hard metal alloy.

833,240 FIRTH-VICKERS STAINLESS STEELS, LIMITED. Ferritic alloy steels.

833,014 UNITED STATES STEEL CORPORATION. Method of treating tinplate and product thereof.

833,016 UNITED STATES STEEL CORPORATION. Self-fluxing synthetic iron scrap and method of preparing same.

833,287 SIEMENS & HALSKE A.G. High-frequency induction furnaces.

833,073 UNITED STATES STEEL CORPORATION. System for supplying oxygen to blast-furnace tuyeres.

833,078 TAYLOR-GILL, A. P. Hardened steels and process for their production.

833,115 GENERAL ELECTRIC COMPANY. Grain oriented sheet silicon steel.

833,388 DEUTSCHE EDELSTAHLWERKE A.G., and ALLGEMEINE ELEKTRICITÄTS-G.m.b.H. Method of and apparatus progressively heating metal strip by the direct passage of an electric current therethrough.

832,883 SALEM-BROSIUS INC. Apparatus for plugging a furnace tapping hole.

833,308 COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH. Stainless steels and method of preparing them.

Fuel Treatment and Utilization

832,075 BERGWERKSVERBAND G.m.b.H., formerly BERGSVERKVERBAND ZUR VERWERTUNG VON SCHUTZRECHTEN DER KOHLENTECHNIK G.m.b.H. Desulphurization of coke-oven gases.

832,129 KOPPERS G.m.b.H., H. Apparatus for returning to a horizontal coke-oven coal carried therefrom during levelling of the charge.

832,524 STAMICARBON N.V. Furnace installations for firing solid fuel.

832,876 KOPPERS COMPANY INC. Coking retort ovens.

833,426 MERCOL DESCALIN COMPANY, LIMITED, formerly MERCOL PRODUCTS, LIMITED. Machine for breaking coal or coke or other solid materials.

833,765 BADISCHE ANILIN- & SODA-FABRIK A.G. Process for treating a crude benzene with purified coke-oven gas.

Law Cases

CROWN APPEAL SUCCEEDS

Harton Coal Company's Surtax

IN the Chancery Division Mr. Justice Pennycuick has allowed with costs, a Crown appeal against a decision of the Special Commissioners for Inland Revenue in favour of the Harton Coal Company, Limited, colliery owners, of South Shields, which is in liquidation, discharging directions concerning the company's income for surtax purposes in the years 1948 to 1951 on the ground that the company was a subsidiary within the meaning of sub-section 6 of Section 21 of the Finance Act, 1922.

Mr. Justice Pennycuick made a declaration that the company was one to which Section 21 applied and restored the surtax directions. The defect in the Commissioners' reasoning, he said, seemed to him to lay in their determination that "control is throughout this legislation related to be beneficial ownership."

That was a proposition which counsel for the company had not attempted to support. The appeal must succeed.

Steelworker's Appeal Dismissed

RESERVED judgment given by the Master of the Rolls in the Court of Appeal dismissed an appeal by Mr. Leo Close from a judgment of Mr. Justice Winn at Swansea last July dismissing his claim against his employers, the Steel Company of Wales, Limited. The bit of an electric drill he was using in January, 1956, broke and a piece entered his eye. Mr. Close sued the company alleging negligence at common law and breach of statutory duty securely to fence the drill.

The Master of the Rolls said that the accident was not one which would be reasonably foreseeable in the ordinary course though it was one which those responsible, if they had closely reflected upon it, would have said could happen, though the chances were extremely remote.

Having referred to conclusions of the House of Lords in relevant cases, the Master said that in their Lordships' judgment the answer to the question whether the relevant part of the machine could fairly and sensibly be described as dangerous in the circumstances of the case was in the negative and the appeal failed.

Leave to appeal to the House of Lords was given.

JUDGE DEFERS WINDING-UP DECISION

STATING that he did not think it right at the moment to wind up the companies in view of the proposals for raising money, Mr. Justice Pennycuick in the Chancery Division adjourned for three weeks the compulsory winding-up of Wright & Platt, Limited, ironfounders, engineers' pattern makers, etc., of Edgbaston, Birmingham, and nine associated companies. The petition was presented by Barclays Bank, Limited, creditor for £106,000.

For the bank, Mr. Raymond Walton said the company had failed to comply with a demand for repayment on March 2, although the bank had been pressing for repayment since last November. The bank had heard all the promises of negotiations before. Wright & Platt was very heavily indebted. Had it been convinced the negotiations would succeed the bank would not have pressed for petitions.

Mr. Leonard Cohen, for the companies, and Mr. Reginald Dixon Weatherell, managing director of Wright & Platt and a secured creditor for £140,000, said the company had very considerable assets which substantially exceeded its liabilities. Negotiations were proceeding for a loan to the company and its subsidiary of £150,000 to be secured by a debenture. There was a very real prospect of the company raising the loan.

Apart from the bank and Mr. Weatherell there were other creditors of about £80,000, not one of whom had come to the support of the bank.

£4,250 DAMAGES FOR SHIPYARD DRILLER

DAMAGES of £4,250 were awarded by a jury in the Ulster High Court to Mr. Harold Stewart (54) for personal injuries which he received in a shipyard accident. Mr. Stewart, a driller at the Belfast shipyard of Harland & Wolff, Limited, claimed that he was walking along a slipway when a heavy steel plate fell on his head.

The defendant company admitted liability but disputed the nature and extent of the injuries suffered.

JUDGMENT BY CONSENT for £6,556 was awarded at Chester Assizes to Mrs. Isabella Maguire, whose husband, John Maguire, was killed in an explosion at the steelworks of John Summers & Sons, Limited, Hawarden Bridge (Ches), in July, 1956.

EIGHT MEMBERS of the crew of a Tyne Improvement Commission dredger were discharged conditionally on a joint charge of stealing scrap metal valued at £47 6s. The men said they sold the scrap dredged up from the river bed as some compensation for the dirty state they got into doing their job.

SALEM ENGINEERING COMPANY, LIMITED, of Milford, near Derby, announces that as from May 23 the name of the company has been changed to Salem-Brosius (England), Limited. The change of name is intended only to indicate the company's close relationship with Salem-Brosius Inc., of Pittsburgh, USA, and its associated companies throughout the world.

Personal

After 21 years as manager of the shear blades department of Firth Brown Tools, Limited, Sheffield, Mr. HARVEY PLESSEY has retired.

Mr. R. E. HOWELLS, an administrative officer with the South-Western Divisional Coal Board at Cardiff, has been elected chairman of Caerphilly Urban Council.

Mr. T. C. BAILEY, industrial fuels sales manager, Shell-Mex & B.P., Limited, is to retire on June 30. He will be succeeded by Mr. E. RENDALL the company's north-eastern divisional manager, Leeds.

Institute of Cost and Works Accountants has elected Mr. F. M. W. HIRD vice-president for a second year. Mr. Hird is the secretary of Frederick Smith & Company Wire Manufacturers, Limited, Halifax.

The Minister of Power has appointed Mr. OLIVER H. JONES, managing director of Pope & Pearson, Limited, brick manufacturers, of Leeds, to be a member of the Industrial Coal Consumers' Council.

The Aluminium Development Association has appointed General Sir GEOFFREY BOURNE, director-general to succeed Air Commodore W. Helmore, who recently retired after 14 years as director-general of the association. General Bourne has been ADC General to the Queen since 1959.

Presentation was made to Mr. JOHN FERGUSON, works manager at the Sunderland works of George Clark (Sunderland), Limited, marine engineers, on his retirement recently. Mr. Ferguson, who is 64, joined the North-Eastern Marine Engineering Company, Limited, Wallsend, as a draughtsman 40 years ago and took up his last appointment 25 years ago.

Mr. ANTONY NORMAN, chairman of Electronic Instruments, Limited, Richmond (Surrey), who has just returned from a month's tour of Canada and the US, made co-operative research arrangements with the Milton Roy Company, Philadelphia. In Canada, he spent some time with the associate EIL concern, the Glendon Instrument Company, Limited.

Mr. F. PAYNE, who has retired after 51 years' service with the Blue Circle Group, has resigned his directorships with the Cement Marketing Company, Limited, Anchor China Clay Company, Limited, Riddlesdown Lime Company, Limited, South Wales Portland Cement & Lime Company, Limited, Thurrock Chalk & Whiting Company, Limited, and W. Marshall (Hessle), Limited.

Mr. P. J. C. BOVILL, managing director of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, and Master Cutler, flew back to Sheffield on Saturday, after his presentation of a case of Sheffield cutlery to Mayor Robert Wagner, in New York. The gift—a set of 24 steak knives from the Sheffield Cutlery Manufacturers' Association—had been impounded when Mr. Bovill flew into New York, but with the help of authorities there it was released by the Customs in time for the presentation. Afterwards, Mr. Bovill drove across the city in a police car to keep an appointment for a helicopter flight over New York.

WORK IN THE field of corrosion, including research into the merchanism of corrosion inhibition, was an outstanding feature of the activities last year of the Arthur D. Little Research Institute, at Inveresk, Midlothian, according to its annual report. The scale and scope of the institute's work, says the report, increased considerably during 1959, the third year of operation, and investigations financed by Government agencies and industrial organizations both in the UK and US have been undertaken.

Legislation for Marking Hand Tools Urged

"UNLESS we continue to have a relentless and patient organization watching over the interests of the hand-tool industry, we shall suffer." Mr. J. Hugh Neill, deputy chairman and joint managing director of James Neill & Company (Sheffield), Limited, gave this warning to members of the Federation of British Hand Tool Manufacturers when he was installed as its chairman recently.

He welcomed the proposal of the standing committee of the Board of Trade that imported tools should bear an indication of their country of origin. He said that it was nine years since recommendations had been made and he urged early legislation to implement the proposal.

Mr. Neill, who was last year's Master Cutler, has been a member of the executive council of the federation for some years and succeeds Mr. S. L. Elliott, a director of Elliott-Lucas, Limited, Cannock (Staffs), as chairman. Chief guest at the luncheon following the meeting, was Mr. A. Worden Evans, Canadian Trade Commissioner (Liverpool), who spoke of Canada as a competitive and growing market.

Scots Finalists in British "Apprentice of the Year"

WINNER in the technical section of the Scottish finals of the British "Apprentice of the Year" Award Scheme which ended in Edinburgh on Saturday was A. H. B. Fairlie, an apprentice with Babcock & Wilcox, Limited, manufacturers of water tube boilers, boiler house equipment, nuclear power plant, etc., of Renfrew, Scotland. Fairlie will now go forward, together with the winner in the crafts section, to the British finals to be held in Birmingham later this month.

Winner in the technical section will spend a year in Australia; winner in the crafts will go to Western Germany for six months, and the winner in the commercial section will tour the United States for six months.

Mr. R. W. Adams, president of Edinburgh Junior Chamber of Commerce said that although the overall standard displayed by Scots competitors was high, many owed their failure to pass on to the British finals to their inability to express themselves clearly and precisely.

Baker Perkins Group Acquisition

NEGOTIATIONS have been completed by the Baker Perkins, Limited, group of manufacturing engineers and makers of specialist machinery for a large number of industries, of Peterborough, for the acquisition of Rownsons (Conveyors), Limited, makers of mechanical handling equipment, of London, N.7. Rownsons (Conveyors) originated in 1909 as the enginering department of Rownson, Drew & Clydesdale, Limited, and became a wholly-owned subsidiary three years ago.

Rownsons (Conveyors) has been associated to an increasing extent with Baker Perkins during recent years. The directors of the company will be Mr. H. Crowther (chairman), Mr. C. N. Brown, Mr. A. G. Anderson, Mr. J. A. Marriott, and Mr. H. W. Gregory.

Company News

FINANCE OUTLINE

For English Steel's £30,000,000 Project

FINANCING of the expansion plan of the English Steel Corporation, Limited, was dealt with by Lord Knollys, chairman of a parent company, Vickers, Limited, at the annual meeting of Vickers on Wednesday. The total cost of the project, which will raise capacity by one third to 1,000,000 tons a year, will be £30,000,000, including additions to working capital. The bulk of the sum will be borrowed on short and medium term and the £16,000,000 or so raised in this way will be repaid from the ESC cash flow when the new plant is in operation—scheduled for 1963.

Of the remainder, about half—£7,000,000—will be raised on a debenture to be issued at a suitable date by English Steel itself and the other £7,000,000 will be supplied in the form of further equity or loan capital by the parent companies, Vickers and Cammell, Laird & Company, Limited. Vickers will find three quarters of this and, it is stated, should be able to do so from its own resources without having to make an issue.

Lord Knollys said that the total steel production of the English Steel group in the first four months of 1960 was on an annual rate 20 per cent. higher than in the same period of 1959, though profit margins were tight. The prospects for 1960 were good for Vickers engineering companies. Steel profits should be maintained and in shipbuilding, deliveries would be on the same level as last year.

S. INSTONE & COMPANY, LIMITED—Once again no dividend is being recommended. The previous year's loss of £16,849 was reversed to a profit of £9,089.

NEWALL ENGINEERING COMPANY, LIMITED—Group net profit rose to £74,917 from £62,101, for the year ended March 31, and the dividend is raised from 15 to 17½ per cent.

BOWDEN (HOLDINGS), LIMITED—Final dividend of 11½ per cent. for the year ended March 31, 1960 makes 15 (10) per cent. Net profit was £66,564 (£47,324), after tax of £47,050 (£28,302).

SANDERSON BROS. & NEWBOULD, LIMITED—Group net profit for 1959 was £199,599 (£163,688), after tax of £216,952 (£171,130), and the dividend is increased by 10 per cent. to 35 per cent.

TRUSSED CONCRETE STEEL COMPANY, LIMITED—The chairman, Sir Halford Reddish, announces that orders in the first five months of the current year were nearly 50 per cent. up on the corresponding period of last year.

MASON & BURNS, LIMITED, malleable ironfounders, etc., of Walsall—A profits recovery and doubled dividend of 20 per cent. is announced. Net profit for the year to March 31, 1960, was £10,197 (£4,835), after tax of £9,050 (£4,450).

BRECKNALL, DOLMAN & ROGERS, LIMITED, manufacturers of wrapping and packing machinery, of Bristol—Interim dividend in respect of the year to September 30, 1960, is raised from the equivalent of 10 per cent. to 13½ per cent.

HAMMOND LANE FOUNDRY COMPANY, LIMITED—Turnover increased substantially and the final dividend on the ordinary capital of 12½ (10) per cent. brings the total to 17½ (15) per cent. Net profit for the year to March 31, 1960, increased to £38,246 (£31,662).

SPECIALLOID, LIMITED, manufacturers of pistons, piston rings, and gudgeon pins, of Hunslet, Leeds—Net profit rose from £26,259 to £45,464, after tax of £44,412 (£28,885). The dividend for the year ended April 2, 1960, is raised by 5 per cent. to 20 per cent.

SIMMS MOTOR & ELECTRONICS CORPORATION, LIMITED—Future plans will call for substantial capital investment, says Mr. G. E. Liardet, chairman, and particulars of the method of raising funds will be announced in due course. Order-books and output from the factories are running at record levels.

W. H. ALLEN SONS & COMPANY, LIMITED, mechanical, hydraulic, and electrical engineers, etc., of Bedford—Effective dividend total is being raised to 14 (12) per cent. for 1959, with a final of 11½ per cent. A proposed one-for-two scrip issue is also announced. Net profit, after tax of £412,000, declined from £513,769 to £491,630.

JOHNSON & PHILLIPS, LIMITED, manufacturing electrical engineers and cablemakers, of London, S.E.7—A loss of £144,084 was incurred in 1959 against a profit of £21,397, after tax of £53,000 (£58,000). No ordinary dividend is to be paid for the year, but a 3 per cent. (nil) distribution from profits, not subject to tax, is to be made.

ELLIOTT-AUTOMATION, LIMITED—Investment of "substantial further sums" on plant and buildings in the current year is envisaged, states the chairman, Mr. R. E. F. de Trafford. Group net profit, before tax, for 1959, at £1,015,630 (£818,352) exceeded £1,000,000 for the first time, mainly attributable to a substantial rise in turnover and to improved efficiency.

MORGAN CRUCIBLE COMPANY, LIMITED—Less-tax dividend is being raised from the equivalent of 8.57 per cent. to 13 per cent. for the year to April 3, 1960, with a final of 8 per cent. For 1958-59 a capital profit distribution of 1¼ per cent. was also paid prior to the 40 per cent. scrip issue. Group net profit, after tax of £936,159, expanded from £873,311 to £1,140,929.

DAVIS & TIMMINS, LIMITED, screw manufacturers, of London, E.17—Group turnover for the first 16 weeks of the current year shows an average rate of increase of 30 per cent. compared with the average weekly rate over the whole of last year, states the chairman, Mr. F. Le Neve Foster. He expects that 1960 results will justify a 25 per cent. dividend on the capital as increased by the scrip issue.

RELIANCE-CLIFTON CABLES & INDUSTRIAL PRODUCTS, LIMITED—Final dividend of 9 per cent. maintains 15

per cent. for 1959, but the distribution from capital profits is raised from 3½ to 5 per cent. The adverse conditions which have prevailed since May, 1959, caused the group trading profits to drop from the record £413,247 to £352,062. The net profit was £205,641 (£244,490), after tax of £195,402 (£199,660).

LONDON ALUMINIUM COMPANY, LIMITED—The chairman, Maj. C. R. Dibben, has announced plans to extend further into the field of presswork which will involve considerable capital expenditure. A rights issue is to be made "at attractive terms" to provide for which the authorized capital is to be increased to £1,000,000 by the issue of a further 2,150,000 4s. ordinary shares. The increase will also make shares available for the acquisition of other suitable businesses.

SIEBE, GORMAN & COMPANY, LIMITED, manufacturers of breathing apparatus, etc., of Chessington (Surrey)—The chairman, Sir Robert Davis, states that due mainly to lack of new work for the Government net profits fell from £111,842 to £83,039 in 1959. Substantial export orders had not yet been placed, but in the first three months of this year home and export sales were up by 10 and 5 per cent. respectively compared with 1959. The dividend is maintained at 20 per cent.

ASSOCIATED BELTING COMPANIES, LIMITED—In a letter to shareholders the chairman, Mr. K. B. Taylor, states that liquidation of the subsidiaries, Lewis & Tylor, Limited, and George Banham & Company, Limited, is proceeding and he has been advised by the liquidator that when the sale of the company's premises is completed sums payable in realization of the assets of the subsidiaries will be such that the preference capital of Associated Belting will be intact and indications are that ordinary holders will receive not less than 8s. per 10s. share in the event of its ultimate liquidation.

Orders Placed

Cementation Gets NCB Contract

THORNE Colliery (Yorks), which closed three and a half years ago, is expected to re-open in 18 months' to two years' time. The main contract for work necessary to secure the permanent safety of the two shafts at the colliery has been awarded to the Cementation Company, Limited, the mining and public works contractors, of London, S.E.11.

The North-Eastern Divisional Coal Board estimates the value of the contract at £757,240.

WILLIAM BOBY & COMPANY, LIMITED, water treatment engineers, of Rickmansworth (Herts) has been awarded a contract valued at more than £20,000 by Courtaulds, Limited, for the extension of its Courtelle plant, Grimsby.

ORDER FOR 10 level-luffing cargo-handling dockside cranes has been received by the Mossend branch of Clyde Crane & Booth, Limited, Gateshead, from the Tees Conservancy Commissioners. The cranes are for Tees Dock, No. 1 Quay.

Committee of the Engineering Centre, Birmingham, has elected Mr. A. G. BANKS president in succession to Mr. V. BRENNER, who has held the office for four years. Mr. Banks is a director of Johnsons Iron & Steel Company, Limited, and of Johnsons Rolls, Limited. He has been a member of the committee of the centre for six years, for four of which he was treasurer. Mr. Brenner becomes vice-chairman.

The Scrap Markets

Home Supplies Still Inadequate

ECONOMY of the steel industry is still based upon the use of a larger proportion of pig-iron. As the supplies of home iron scrap have proved to be inelastic, imports are rising very rapidly.

It follows that the avid demand for home-bought scrap, so much cheaper than imported material, still continues.

Cleveland—April arrivals of scrap cargoes from foreign ports exceeded the total receipts for the whole of last year.

Merchants are able to take care of the heavier calls for cast iron scrap, although at the end of the first quarter the number of men employed in the foundries was 6,000 more than the corresponding figure for a year ago.

South Wales—The market is very active with merchants making an all out effort to bring into the area all supplies of available scrap of all weights and grades. Steelmakers still make demands for heavy and better grade scrap for the making of steel but too often this quality is unobtainable. Imports of scrap iron and steel are very few and far between, and the quality of imported scrap is very uncertain.

As merchants have maintained supplies to keep the furnaces operating output has not suffered because of the very real shortage, but the position becomes more acute as the weeks pass. There are no supplies of scrap lying in the yards, nor are the steelmakers and ironfounders carrying much more than day to day supplies to maintain output.

Scotland—A strong demand is maintained in most sections of the trade. The steelmakers' order-books are well filled for a considerable period ahead and they are calling for an ever increasing tonnage of scrap to maintain their production at the highest possible levels. Deliveries of heavy steelmaking scrap are well maintained and regular consignments are moving freely to the various consuming works.

The production of steel turnings remains constant and little difficulty is experienced in disposing of this grade of scrap provided it is free from alloys and bunchy materials. Cast-iron borings are also plentiful and the blast furnaces are keen to take all possible deliveries. At the cast-iron foundries there is little improvement and consequently the demand for heavy cast-iron scrap is slow and orders that are on the market are for the light or medium grades of cast iron.

Coal-fired Power Stations for Yorkshire ?

SINCE increasing quantities of small coals, suitable for electricity generation, are expected to become available in Yorkshire, the Central Electricity Generating Board is to investigate the suitability of six areas in the West Riding for the construction of large coal-fired power stations. If sites with facilities for large power stations can be found near the coalfield it will be possible to use the coal efficiently and economically for generating electricity, the board says.

Sites adjoining the existing power stations at Ferrybridge and the new station under construction at Thorpe Marsh, near Doncaster, are to be examined and four new areas at Knottingley, Kellingley, Eggborough, and Gowdall, are also under consideration.

IRON AND STEEL TRADE

EVEN the efforts of the steelmakers to restrict what are euphemistically described as "seasonal influences" wilted before the enervating effects of the heat wave. With the lengthening of holidays with pay the impact on steel output is known and expected. Scottish steel operatives begin their holidays in July and August is the peak month for the English works and it is small wonder that consumers' steel stocks have been raised to the highest level for several years. The intake of oversea ore, already 50 per cent. up for the first four months of the year, is still increasing and at a rate which promises new pig-iron production records as the year advances.

Pig-iron

There is no news of any additional blast furnaces having been restarted this week. Requirements of the steel melting shops and the iron foundries have increased very considerably, but the blast furnaces have been enabled to get by without any variations in the number of units employed.

Whether they will be able to do so during the approaching period of a waning demand remains to be seen, but users of pig-iron are fortified by their substantial stockholdings. These were probably increased during the Whitsuntide break when the stoppage of certain sections of the steel industry and the foundries assisted in bringing consumption and production more into alignment.

Semi-finished Steel

First output of the new billet mills are coming into circulation. It should materially relieve the dependence of the re-rolling industry upon imported tonnages. This trend, however, may not become immediately visible in the Board of Trade returns.

Finished Steel

Distribution of billets, blooms, and slabs has not yet overtaken the requirements of the rollers of sheets, and light re-rolled categories of bars and sections.

A noteworthy but not insignificant event of the past week has been the lighting of the first of a battery of coke ovens at the £50,000,000 steel plant at the South Works of the South Durham Steel & Iron Company, Limited, which is now in course of construction. It is the first step in the ordered progress of one of the biggest expansion schemes of the north-east coast towards a state of full production. This cannot be achieved too rapidly in an industry whose abundant activity is common to all sectors, including the manufacture of plates and heavy sections and whose outputs have increased 60 per cent. in 12 months.

Hadfields' Order-book Shows Improvement

SINCE the beginning of the financial year there has been a decided improvement in the volume of orders and inquiries received by Hadfields, Limited, the Sheffield steelmakers and engineers. In view of the improved outlook, the interim dividend in respect of the year ending in September, 1960, is raised from 2 to 3 per cent. In the previous year a final dividend of 4 per cent. made 6 per cent. for the year.

Pulp and papermaking division has secured several substantial contracts which will not be completed before the end of the current trading year. Other important projects, both for home and oversea, are being negotiated.

"Economic Madness" to Denationalize RTB

PROPOSED "denationalization" of the largest remaining State-controlled steelworks—Richard Thomas & Baldwins, Limited, by the disposal of the company to private enterprise is to be debated in the House of Commons on June 27, a week after Parliament's return from the Whitsun recess. The proposal is likely to meet bitter opposition from the Labour benches.

Speaking at Earlstown (Lancs) on Thursday of last week, Mr. Frederick Lee (Lab.) said it would be "sheer economic madness" to touch off what he called a "scramble" for RTB's capital when it was building the vast Spencer Works at Llanwern on which the industry's ability to expand home production largely depended. "By general consent the price now obtainable is below maximum owing to the state of the market," he declared. "A decision to sell would clearly be contrary to the national interest."

Last weekend Mr. Hilary Marquand, Labour MP for Middlesbrough alleged that the Government was preparing an "artificial division of capital" in denationalizing RTB. One block would pay fixed dividends to the Government and the other would be sold to speculators who would "scoop off the cream" as profits. This transaction, he maintained, was unnecessary and would not serve to increase steel output.

Widening Scope of Head Wrightson Subsidiary

SPECIALISTS for many years in the design and supply of colliery surface equipment. Head Wrightson Colliery Engineering, Limited, Sheffield, is to change its name to Head Wrightson Minerals Engineering, Limited. The company, a subsidiary of Head Wrightson & Company, Limited, has taken this step to bring its title more into line with its activities.

In recent years it has had a growing interest in the treatment of minerals other than coal and another important expansion is to take place shortly in connection with iron-ore treatment. Its interest in and capacity for work for the colliery industry will be maintained and no change in the direction or organization of the company is envisaged.

THE Reay Brass Foundry Company, Limited, Stockton-on-Tees, is to erect a foundry on the Portrack industrial estate, Stockton.

Coalfield News

Northern Veterans Honoured

"A MORE loyal, honest, and hard-working set of men I have never had the pleasure of meeting in any of the collieries I have been at." With that tribute Mr. R. Taylor, former manager of Group "C" of the Southern Northumberland Area of the Northern (N&C) Divisional Coal Board, presented long-service certificates to 82 retired miners at Prudhoe recently. He went on to say that no-one outside the industry knew the conditions some of the men had to work in. "But we had a trouble-free life with never any talk of strikes or walking out," he said.

Among the recipients was Mr. Joe Peart (80) who spent all his working life at West Wylam Colliery (Northumberland), starting as a driver at 12 for a wage of one penny an hour. In the 60 years that he worked at the pit he never lost a single shift through sickness or injury. He retired through ill-health eight years ago and still holds the local record for long service.

The ceremony was organized by the Mickley and West Wylam Consultative Committee.

COAL AND COKE shipments through the port of Garston in May totalled 73,047 tons of which 71,260 tons were coal.

GREENRIGG COLLIERY, Fauldhouse (West Lothian) closed last Friday. Most of the 350 miners affected have been transferred to other pits in the Area.

WORK RESUMED on Thursday of last week at St. John's Colliery, Maesteg (Glam), after an unofficial one-day stoppage had made nearly 1,000 workers idle.

AFTER 55 YEARS as a miner, Mr. William Rafferty has retired. He started as a boy of 12 at Whitehill Colliery, was for over 40 years at Sheildmains Colliery, and for the past three years worked at Polquhairn Colliery (Ayrshire).

HIGHER LEVEL of productivity is being maintained in the Durham Division of the NCB. In the first 21 weeks of this year, overall productivity averaged 21.99 cwt. per manshift, compared with 21.58 cwt. per manshift in the same period a year ago. At the face, o.m.s. reached 64.73 (62.83) cwt.

NINE PIT-PONIES at Brereton Colliery (Staffs) are to be transferred to the NCB pony farm at Rawnsley when the pit closes. The ponies, which are to be allocated to other mines, have been under the care of Mr. H. Rochall at Brereton, during which time they have taken part in several Royal Shows.

Thanks to the efforts of the NCB, local industrialists, and local authorities, fish are returning to "the valleys" in the mining area of Glamorganshire for the first time in more than 80 years. In 1951 it was estimated that about 200,000 tons of coal and coal dust was carried down the river Taff every year. Now the NCB has introduced reclamation plants at all mines with a long life and in one year recovered 185,000 tons of coal dust from the river.

PLANNING PERMISSION has been granted to the Metal Box Company, Limited, for a £35,000 extension to its factory which is being built in Arbroath (Angus).

NEW FACTORY, costing £200,000, is to be built on the Newburn Estate, Newcastle-upon-Tyne, by Aveling-Barford, Limited, engineers, etc., of Grantham (Lincs.).

"Nuclear Power Costs Lower than Coal"

CHEAPER electricity will be obtained from nuclear power stations than from coal stations in the future, forecast Mr. H. G. Nelson, managing director of the English Electric Company, Limited, at the British Electrical Power Convention at Bournemouth last week, in an address contrasting slightly with a speech made by Sir Christopher Hinton in Madrid the same day (see facing page).

Comparing the economics of coal and nuclear power stations, he said that at current prices of fuel to the Central Electricity Generating Board, one pennyworth of uranium could be made to produce more than seven units of electricity, whereas a pennyworth of coal would yield less than two and a half. Further, the long-term trends indicated a steady decline in the price of uranium and an increase in the price of coal.

Economic comparison of coal and nuclear power stations was most complicated, depending on the relative importance at any given time of capital and operating costs, on load factor, and on the technological considerations. It appeared reasonable, however, to expect that by the end of this decade electricity for base load operations would be produced more cheaply from nuclear than from coal stations.

In the more distant future, said Mr. Nelson, there were possibilities of the direct generation of electricity either from hydrogen fusion, fuel cells, or some thermo-electric technique, but it was doubtful whether any of these would be competitive sources of power within the next 20 years.

Commenting on the lack of profits by manufacturers from nuclear power station construction, he said the consortia had to maintain large teams of engineers but the slow rate of ordering—three stations every two years—and the sharp price competition between the groups, made it impossible to recover the cost.

Mr. C. R. King, chairman of the Electricity Council, told the convention that the CEGB's research department had started a new programme of studies on direct generation. Known as the "magnetohydrodynamic (MHD) concept," it could make conventional boiler plant and turbo-alternators unnecessary.

The coming challenge from Russia and America to Britain's position as the largest supplier of electrical goods to non-manufacturing countries was dealt with by Mr. E. V. Small, Associated Electrical Industries, Limited. He felt the industry should not be satisfied with the present overall results for goods exported. When they considered the improved conditions under which the industry was now operating with millions spent and being spent on expansion of plant, development, and replacement of out-of-date machinery, an overall target of 25 per cent. should not be impossible.

The overall shrinkage in the quantity potential market oversea, Mr. Small said, was because of the steady increase in volume and range of locally manufactured products. This shrinkage must force them to pay more attention to the production of high precision goods and to the sale abroad of designs and know-how resulting from British research and investment.

OUTWARD MOVEMENT of coal, coke, and patent fuels at Grimsby and Immingham went up from 86,531 tons to 113,077 tons for the four weeks ended May 22. Larger intakes of iron and other ores, compared with the same period last year, were also reported.

THE COAL TRADE

APART from a moderate demand for small quantities of best and hand-picked coals, trade is at a very low level in the domestic sector. There are variations from district to district, but by and large, the weather, approaching holidays, and procrastination are not encouraging people to build up stocks. Fortunately the industrial demand remains fairly constant, and although a much bigger trade could be done, particularly in exports, the threatened decline seems to have been satisfactorily arrested.

DURHAM AND NORTHUMBERLAND

The market generally is dull although there is a steady volume of business in superior large and graded steams with Durham coking coal and carbonizing mixing varieties and Durham industrial cokes selling well.

Scandinavian and West German contracts are helping the export section but new business is slight.

WEST MIDLANDS

A brisk demand for house coal has been experienced throughout May. With the advent of summer, however, trade generally has tended to fall away, especially with the dealer class. Orders are being placed for popular brands known to be in short supply in the difficult months of the year. The best qualities in the higher grades are fairly well absorbed, but at some pits best selected coals are not moving so freely.

Most of the moderately priced coals of the larger variety are finding buyers, while there is now a distinct shortage of kitchen coals. House nuts are a weak feature and heavy tonnages are being stocked. Not a great deal is being done in manufactured fuels, though some of the well known brands are being stocked by merchants. Despite difficulty in securing some of the best anthracite, the supply position has eased. Best stove nuts are now coming through in about the right quantities, and any surpluses over current demand are being stocked by merchants.

Industrial activity continues to expand and bring some benefit, and supplies for the public services are flowing normally. Re-contracting is nearly complete and prices appear to be rather less than a year ago. The market for hard coke is patchy. The blast-furnace section is strong, but there is not a heavy demand from general engineering. Hard coke nuts are a weak feature, while foundry coke consumption continues to expand.

Seaside Holiday for Disabled Miners

UNDER arrangements made by the West Midlands Divisional Welfare Committee of the Coal Industry Social Welfare Organization, 40 disabled miners from all parts of the West Midlands Division of the National Coal Board begin a fortnight's holiday at Prestatyn Holiday Camp, North Wales, tomorrow (Saturday). The party will number 103 in all.

Travel and accommodation expenses are borne by the West Midlands committee of the CISWO, and the Midlands Area of the NUM and the West Midlands Divisional Coal Board share the cost of the fares and accommodation for children under 15 and of the extra pocket money provided for those of the men who have not obtained employment outside the industry.

"If you Prefer the Facts"— About Coal

TO combat misconceptions regarding solid fuel the Durham Divisional Coal Board is sending out to architects, local authorities, hospital management boards, and others in the division, an excellently prepared booklet entitled "If You Prefer the Facts."

Rightly, because it cannot be emphasized too frequently or too strongly, the booklet hammers home the fallacies which arise too often from comparisons between old solid fuel burning plant and new oil-burning equipment. A table of comparative costs, based on more equal conditions, plainly shows the advantages of solid fuel.

Although it is stressed that a flourishing coal-mining industry is of vital importance to the economy of Britain, and particularly in the north-east where some 100,000 are employed by the NCB in mines and ancillary undertakings, the booklet does not omit to back up such sentiments with telling facts and figures likely to convince the hard-headed businessman.

It states that the Durham Divisional Coal Board offers coal and coke on merit as the ideal fuels; they are locally produced, their supply is assured, and they can be the most economical. And it goes on to prove its case.

Coal's Challenge to Nuclear Power

INITIAL cost comparisons between nuclear and conventional power plants were misleading, said Sir Christopher Hinton, chairman of the Central Electricity Generating Board in Madrid on Tuesday. Sir Christopher was lecturing on "The Lessons of the Past Seven Years in Atomic Energy" to the World Power Conference.

Too high a credit rate had been given for the plutonium atomic fuel which was produced as a by-product of the burning of the uranium, he said. There had been a rise in interest rates and the rapid development of coal-fired plants had greatly reduced the cost of conventionally-fuelled power stations.

Yet, the downward trend in the cost of power produced from successive nuclear power plants of the Calder Hall type was promising and in the long run nuclear power still promised as it did seven years ago, to be an effective and economical supplement to world power resources.

Nuclear power was meeting with tougher competition from conventional fuels than had been expected, Sir Christopher added, but it was good for both technologies that that should be so.

In Parliament

MANGANESE STEEL SHORTAGE

Reported shortage of silicon manganese steel, used for the production of coil springs, was to be investigated by the Iron and Steel Board in consultation with the Coil Spring Federation and with steel producers, said MR. JOHN RODGERS, Parliamentary Secretary to the Board of Trade, replying to MR. GEORGE DARLING (Lab. & Co-op.). Until the examination was completed it was not possible to say whether imports of steel were likely to go up. There was no reason to think that exports of products incorporating coil springs would be adversely affected.

Mr. Rodgers' statements were not borne out by statements made by manufacturers in Sheffield, said MR. DARLING. One of the biggest manufacturers had said that he was going as far away as Japan in search of steel to bring to Sheffield. The situation arose because private steel companies would not plan ahead to meet demand but waited for demand to catch up with them, he maintained.

MR. RODGERS gave an assurance that the Board of Trade was keeping in touch with the Iron and Steel Board through the Ministry of Power. Should a shortage of silicon manganese exist they would take any steps necessary to avoid loss of exports.

SHORTAGE OF CASTINGS

NO admission that there was a general shortage of castings could be extracted by MR. STEPHEN SWINGLER (Lab.) from MR. JOHN RODGERS, Parliamentary Secretary to the Board of Trade. Mr. Swingler suggested the shortage was jeopardizing the export trade of the machine-tool industry. One of his constituents, he said, had sent him a mass of evidence from the *Foundry Trades Journal* showing that there was a shortage.

MR. RODGERS said that Newcast Foundries, Limited, Silverdale (Staffs), had sent copies of letters from four other companies, in the main connected with Newcast Foundries. He had examined the correspondence and there did not appear to be a general shortage. If any machine-tool firm was finding difficulty in obtaining supplies of castings it would be well advised to discuss its problems with the Iron and Steel Board.

In a written answer the MINISTER OF LABOUR, Mr. Edward Heath, told Mr. Swingler that every effort would be made to fill vacancies notified in order to overcome a shortage of skilled labour in the machine-tool industry which was being experienced in some areas.

NATIONALIZED INDUSTRIES' FINANCE

DURING the committee stage of the Finance Bill Conservative backbenchers were successful in winning an admission from the Chancellor of the Exchequer that there was a necessity for Parliament to scrutinize the annual investment programme of each nationalized industry before the money required was actually voted.

It was expected, Mr. Heathcoat Amory said, that by the autumn new proposals could be made for handling these matters on a more satisfactory basis.

IF RESTRICTIONS were imposed on British owners placing orders for vessels abroad, and other countries took retaliatory action, great harm could be done to our shipping industry, said the Minister of Transport, replying to a question from Mr. Frederick Willey (Lab.).

Scottish Miners Fear Two Crises

"DOES the Coal Board think that men will stay underground for £11 a week when there are jobs going at places like Bathgate where they will pay equal wages for sweeping the floors?" This question was put by Mr. D. Kelly, general secretary of the Association of Colliery Enginemen, a fraternal delegate to the conference of the Scottish branch of the National Union of Mineworkers, on Thursday of last week.

The number of craftsmen in British pits was down already to 50 per cent. of what it should be, he said. By the end of the year the shortage could affect safety. Miners were leaving the industry in their hundreds to go into new factories. "It will need another 8s. a shift (£2 8s. a week) to arrest this drift from the collieries," said Mr. Kelly.

Another crisis forecast was that of lack of suitable youth recruitment into the industry. Mr. McGahey said that in 1959, 676 young people were recruited, but 411 left the industry during the same year. Wastage among young people was alarming—58 per cent. in Durham and 70 per cent. in South Wales. A serious crisis was developing.

Speaking to a resolution advocating a third week's annual holiday with pay Mr. J. McCartney (Killoch Colliery) said that an extra week would save much of the expense of stocking coal.

During the major debate on wages and shorter hours, the president of the branch, Mr. Abe Moffat, warned that the Coal Board's loss last year would be used as a lever to resist wage claims. It had cost £27,000,000 to stock coal last year and unemployment for many thousands had been avoided. That meant the industry had subsidized the Government by saving unemployment benefit.

Mr. Moffat also maintained that the Scottish coalfield, where there was a loss of £14,000,000 last year, was selling coal at 14s. below the actual cost of production, the bulk of it to big industry. The miners, therefore, were not only subsidizing the Government but also private enterprise.

This year productivity would increase to the highest in western Europe and the miner could not be isolated from the wages movement which had given 5,000,000 British workers increases in the past three months.

The conference also demanded that legislation be introduced making it compulsory for fire-resistant belting to be used underground, that booster fans be under constant supervision and fireproofed, and that signals be introduced so that fires could be prevented from spreading underground.

On Friday, the final day of the conference, delegates unanimously called for nationalization of distribution, allegations being made that consumers were paying more than twice the pithead price for their coal. Mr. Alex Eadie, a Fife county councillor, said the case had been made out for public accountability and ownership so far as the distribution of coal was concerned. The time was now opportune to bring it about, he maintained.

NEW HEAD OFFICE address of Rhodes, Brydon & Youatt, Limited, pump manufacturers, is Reddish Engineering Works, Stockport, Cheshire (telephone: HEAton Moor 6211), following their move from old premises at Waterloo Engineering Works.

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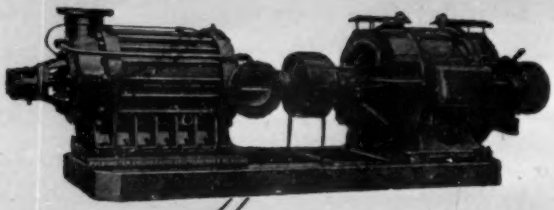

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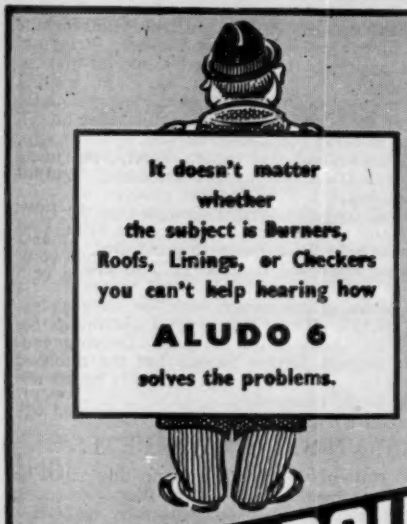

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Appointments

Mr. G. Syke Consultant to BISRA

THE British Iron and Steel Research Association has appointed Mr. G. Syke as a consultant to its physics department. He will be especially concerned with directing the work of the instruments section of the department.

Mr. Syke joined the Baldwin Instrument Company, Limited, in 1943, as technical manager in charge of the development department of which he later became director. He started in practice as a consultant in 1955 and held appointments with the Steel Company of Wales, Limited, and the Dunlop Rubber Company, Limited. He is a member of the Society of Instrument Technology and for three years from 1956 was a member of the council of the British Scientific Instrument Manufacturers Research Association.

Mr. P. GLYNNE-JONES has been appointed advertising and publicity manager of Union Carbide, Limited.

Electronic Engineering Association has appointed Wing Comdr. A. R. GILDING as assistant technical secretary.

Mr. J. SPENCE has joined Metal Industries, Limited, as personal assistant to the chairman, Sir Charles Westlake.

Mr. DEREK LEDGARD has been appointed assistant works manager in the engineering division of Fenner's Transmission Engineers, Limited, Hull.

Mr. D. C. WILLIAMS has been appointed superintendent, tinning, warehouse and shipping departments, Trostre, in the tinplate division of the Steel Company of Wales, Limited.

Mr. E. D. WAY has been appointed electrical manager of J. Samuel White & Company, Limited, shipbuilders and marine engineers, of Cowes, Isle of Wight, in succession to Mr. H. G. Cameron who has retired from that position after 32 years.

Mr. N. BREAKWELL, planning engineer (major schemes) for the North-Eastern Divisional Coal Board since 1958, has been appointed Divisional planning engineer, reconstruction department. From 1947 to 1958 Mr. Breakwell was planning engineer for the No. 7 (Wakefield) Area.

Mr. J. D. PARKINSON, parts manager of the International Harvester Company of Great Britain, Limited, since 1955, has been appointed assistant manager of domestic sales. He joins Mr. T. F. Butler, recently appointed to the same position, as assistant to Mr. H. E. Norris.

Pegson, Limited, manufacturers of coal preparation plant, industrial screening equipment, etc., of Coalville (Leics), has appointed Mr. V. L. S. HAWKE as technical representative for the quarry and mining plant division. He will cover quarry, sand, and gravel coating and mining equipment in London and south-eastern England.

Peterborough firm of diesel engine manufacturers, F. Perkins, Limited, has appointed Mr. A. M. CHAMPION manager of the vehicle engine sales department. He joined the company in 1952 and became representative for Wales and the West Midlands two years later. Mr. L. G. T. ROBERTS, who joined the company in 1958, has been appointed assistant manager of the industrial engine sales branch.

Mr. G. H. DOUST has been appointed general manager of Plessey International, Limited. He took up his previous appointment as deputy general manager in 1958, before which he controlled the commercial and sales department of the company's chemical and metallurgical division. Before joining Plessey Mr. Doust was field sales manager of the metal finishing division of the Pyrene Company, Limited.

Mr. B. HOLLINGWORTH has been appointed sales manager (mining) of British Insulated Callender's Cables, Limited, in succession to Mr. J. A. Rodgers. Mr. Hollingworth served a five-year electrical engineering apprenticeship with the Parkhouse Colliery Company, Limited. He joined the wiring development department of BICC in 1950 and three years later was appointed mining sales engineer for the territory covered by the North-East Divisional Coal Board. Mr. Hollingworth is an associate member of the Association of Mining Electrical and Mechanical Engineers.

Mr. F. R. GILLETT, formerly manager of the economics and market research department of Richard Thomas & Baldwins, Limited, has been appointed manager of the central control and planning office of the new Spencer Works, Llanwern. Other appointments at the new steelworks include Mr. R. A. ACTON, formerly project leader of the operational research department, to be assistant manager of the central control and planning office, M. F. CONNOLLY, formerly personal assistant to the managing director, to be assistant commercial manager, and Mr. D. JONES formerly manager of the sheet department at Ebbw Vale, to be manager of the cold mill.

Brighter Prospects for Butterley Company

GIVEN better results this year from the ironworks, which can be reasonably expected on the face of the present order-book, the current year for the Butterley Company, Limited, ironfounders, structural and general engineers, etc., of Derby, should give an appreciably better result, states Mr. M. F. M. Wright, the chairman. A modernization programme was being carried out at the foundry which would increase output and improve working conditions, he said.

Although, as he had said before, great things must not be expected from the oxygen associate, Air Products (Great Britain), Limited, that concern was now well established and Mr. Wright thought that the completion, this autumn, of the tonnage plants being constructed would help the company a great deal.

Group profit improved from £70,275 to £98,111 for 1959—a year ago there were additional provisions for exceptional losses in connection with the oxygen contracts of £758,383. There was a total distribution of 9d. (4d.) per 2s. 6d. share for the year. Developments planned will require further finance but the directors have in mind certain realizations which it is hoped will enable them to be financed.

MINERS' FIRST AID COMPETITION

MINERS' National First Aid Competition is to be held tomorrow (Saturday) at the Winter Gardens, Blackpool. The contest is divided into three sections—senior, junior, and ancillary workers'—and all the Divisional Coal Boards are represented in the first two categories.

Each competitor will have a practical and oral test before the team tests start. Each team will have to deal with a staged incident. The tests will start at 9.50 a.m.

Photograph by courtesy of N.C.B. Northern (N & C) Division, No 3. Area

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African Notes

ISCOR "RATIONS" STEEL

Demands Exceed Capacity Output

TEMPO of the overall South African demand for steel during the past few months has gained momentum. Most rolled steel products are in short supply and the South African Iron & Steel Industrial Corporation, Limited (ISCOR) has had to introduce a rationing system despite the fact that all the company's mills are producing at full capacity. The upward swing in domestic demand has been caused mainly by the need to re-stock. During the recent recession stocks were depleted and consumers were left with less than normal reserves.

ISCOR is adhering to its policy of supplying local markets in times of scarcity, and except for limited tonnages sent to neighbouring territories, no export orders for rolled products have been accepted. Shipments continue of pig-iron surplus for domestic requirements.

A power hold-up has delayed production until the end of the year at the Union Steel Corporation's new 16-in. rolling mill. Production should have begun at the end of last year, but the Electricity Supply Commission (ESCOM) has said that extra power for the mill and other expansion schemes would not be available until a completely new power distribution system was introduced. Transformers and other electrical equipment will have to be imported for the job.

Sahara Iron Ore

In an effort to meet the growing demand for iron and steel products, the steelworks at Que Que, in Southern Rhodesia, are working on a large-scale capital development programme to double the output potential. A new battery of coke ovens, due to operate shortly, will enable coke to be made locally instead of being transported from Wankie. The new sinter plant will make possible the use of fine ore and a third blast furnace will increase the output potential of pig-iron to about 750 tons a day. The full development should be completed by the middle of next year.

Problems hindering the exploitation of large iron-ore deposits in the southern part of the Sahara province of La Saoura, are being considered. The chief obstacles are the distance from water (60 miles) and from the sea (280 miles). The construction of a railway link might also present political problems. The deposits cover 120 sq. miles and contain more than 2,000,000,000 tons of iron-ore.

An order for the two largest converter-fed rock hoist winders to be installed in South Africa has been placed with the English Electric Company, Limited, by Goldfields of South Africa for the West Driefontein and Doornfontein mines. They will be able to lift 10 short tons of rock from 6,000 ft. at 3,600 ft. per min. The General Mining & Finance Corporation has ordered a 5,300 h.p. Ward-Leonard winder for the Scott shaft at Stilfontein. This is the largest of several similar winders ordered for South African mines.

The export prospects for South African coal are improving, partly because of an embargo by the Indian Government on the export of Indian coal. The industry in Transvaal and Natal is benefiting from the demands of Bay of Bengal consumers who formerly used Indian coal; Ceylon has also placed a substantial order with Transvaal Coal Owners' Association.

The outlook for South African coke is also brighter. It is hoped that the temporary policy of curtailing production will enable stocks to be reduced. There is now a rising demand for small-sized coke and also for sized coke. Early this year, Coke Producers secured an order for 15,000 tons for export to Burma, the first big export order for some time.

The detailed investigation of coal resources in the Gwembe area of the Zambezi valley has revealed that six of the seven deposits are of no importance. The other, in the Kanabwe district, is calculated to contain about 17,000,000 long tons, but a report prepared by the Geological Survey Department of the Northern Rhodesia Ministry of Labour and Mines, indicates that the capital costs of exploitation would not yet be justified. "Although it is unlikely to be of immediate economic importance," the report says, "this coalfield is a national asset which could prove of value in the future."

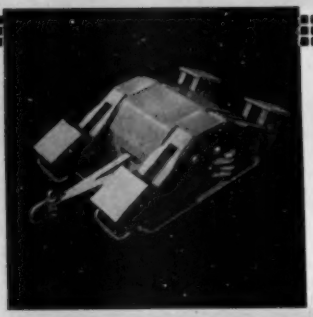
Nigerian Coal

The decline in the demand for Enugu coal was referred to in the Nigerian House of Representatives recently by the Parliamentary Secretary to the Ministry of Mines and Power, Mallam Walin Muri Umaruabba Karim. He said that efforts were being made to find alternative uses for the coal and there was a possibility that a steel industry would be started at Enugu. The Italian, South American, and Japanese markets had been explored as possible customers and a marketing officer had recently been appointed to develop coal sales both at home and abroad.

A drum winder to hoist large tonnages from deep levels has been produced by Mr. R. Blair, a South African engineer, and the Vanderbijl Engineering Corporation of Vanderbijl Park. The winder has undergone successful full-scale tests and two are soon to be installed in gold mines.

Stewarts and Lloyds, of Rhodesia, Limited, has been awarded a £1,000,000 contract to supply 30 miles of piping to carry water from the Shire River to reservoirs at Blantyre and Limbe in Nyasaland. Delivery of the order is scheduled for February, 1962. The contract, awarded by the Mudi River Water Board, calls for the complete pipeline to be made in Britain by Stewarts and Lloyds, in conjunction with the Victaulic Company, Limited, who will supply all the joints to be used in the project.

STEEL FABRICATION



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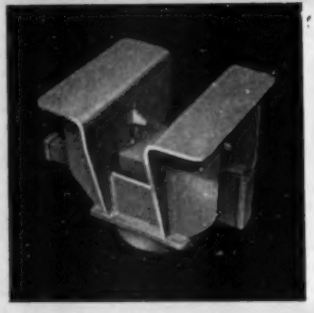

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NEWS IN BRIEF

UNEMPLOYMENT declined, without exception, in every industry and occupation between April 11 and May 16. At 341,176 the final figure for May 16, is more than 50,000 down on the previous month.

FIRE ARMOUR, LIMITED, makers of fire appliances and sprinkler systems of London, W.1, has joined the George Angus & Company, Limited, group, makers of similar equipment, of Newcastle-upon-Tyne.

CHIMBOTE steelworks in Peru plans to double the present production capacity for steel products of 60,000 metric tons a year. After initial difficulties the state-owned plant is now working to full capacity.

RAW STEEL output of the Danish steel concern A/S Det Danske Staalvalseverk increased from 219,000 metric tons to 253,000 tons last year, while the production of rolled steel rose to 191,000 (171,000) tons.

INDONESIA and the USSR have signed a contract for the construction of a steel plant with an output of 100,000 tons a year at Tjilegon, west Java. The Soviet Government is to grant $100,000,000 credit for the project.

A NEW POST-GRADUATE COURSE for the further education of experienced managers in industry and commerce has been established at Edinburgh University. The course will lead to the award of a diploma in management studies.

CHIMNEY, 175-ft. high, was felled at Bearpark Coke Works (Co. Durham) last week. The works were closed some months ago and most of the 750 men formerly employed there have found work at other plants in the county.

DURING 1959 De Wendel et Cie, SA, of Paris, one of Europe's leading ferrous metal concerns, produced 6,390,000 (6,470,000) metric tons of iron ore, 1,980,000 (1,850,000) tons of pig-iron, and 2,460,000 (2,290,000) tons of raw steel.

MACHINE TOOL sales division of S. Guiterman & Company, Limited, London, W.1, known as the Mortimer Engineering Company, Limited, has been acquired by B. Elliott & Company, Limited, machine tool manufacturers, of Cardiff.

NAME OF THE recently-acquired subsidiary of C. C. Wakefield & Company, Limited, manufacturers of lubricating oils and equipment, of London, W.1—De-Corrosion Services (Norwest), Limited—has been changed to Metal Cleaning, Limited.

WEST GERMAN steel production is running at a rate very close to 34,000,000 tons a year, compared with last year's production of 29,400,000 tons. Production in May was 2,860,000 tons and for the first five months of the year the total was 14,040,000 tons.

IRON ORE IMPORTS into the Hartlepools so far this year total 251,282 tons—more than double the figure for the corresponding period last year. Shipments of coal from the port so far this year have dropped to 591,346 tons, compared with 780,447 tons last year.

PARTICIPATION of Aluminium, Limited, of Canada in Alumino Iberico, of Spain, is to be increased to 41.07 per cent. A capital increase of 50,000,000 pesetas to 350,000,000 pesetas is planned by Iberico and the whole of this increase will be subscribed in dollars by Alcan.

EXECUTIVE COMMITTEE of the first International Congress on Metallic Corrosion has appointed the following plenary lecturers: Prof. Y. M. Kolotyrkin, USSR; Prof. P. Lacome, France; Prof. H. H. Uhlig, USA. Dr. U. R. Evans of the UK hopes to be the fourth if circumstances permit.

HEARING IN LONDON by the National Reference Tribunal of the NUM's claim for 12s. a week increase for 300,000 day-wage men has been brought forward a week to June 24. The change will allow the union's executive committee to meet at Llandudno on July 1, eve of the annual conference.

THE Wolverhampton Die Casting Company, Limited, has bought the Ludlow factory of Falk Stadelman & Company, Limited, manufacturers of lighting, heating, and cooking appliances, of Birmingham. The 25,000-sq. ft. factory is to be converted into a self-contained die-casting unit providing work for 150 people.

THE WORKS OF Bruce Peebles & Company, Limited, Edinburgh engineers, will close for the Edinburgh trades holiday on the evening of July 1 and reopen on the morning of July 18. No goods will be received after June 29 until the reopening date and goods cannot be despatched during the holiday period.

NAME of the Salem Engineering Company, Limited, furnace designers and builders, of Milford, near Derby, has been changed to Salem-Brosius (England), Limited, to indicate its close relationship with Salem-Brosius Inc., of Pittsburgh, USA. There is no change in management of the company or board of directors.

TO MARK the occasion of the completion of the 4,000th International B-6K-3 Drott shovel, the managing director of International Harvester Company of Great Britain, Limited, Mr. O. G. Voss, formally handed over the equipment to Mr. D. Pearce, the plant manager of APC (Plant Hire), Limited, Avonmouth.

THE COUNCIL of the National Institute of Industrial Psychology has decided that the Verulam Prize for 1960 shall be awarded to Dr. R. B. Buzzard, of the Medical Research Council, who for 10 years has been engaged in research into attendance and absence from work, and has made an exceptional contribution to knowledge in this field.

CONTINUED INCREASE in applications for patents and trade marks and in applications from other countries, including the USSR, is referred to in the annual report of the work of the Patent Office in 1959. This increase coupled with the difficulty in recruiting qualified staff has led to arrears of unexamined complete specifications of 37,068.

PERMISSION has been granted by the European Coal and Steel Community High Authority for Dortmund Hörder Hüetten Union to acquire majority control of Hüttenwerke Siegerland, Germany's largest producer of sheet steel. Hütten Union has for a long time had an option of 51 per cent. on Siegerland's nominal capital of DM 46,000,000 (about £3,900,000).

PRIZES totalling 600 guineas, with a first prize of 250 guineas, are being offered in a competition to find the best black and white picture of Jones cranes. It is sponsored by George Cohen, Sons & Company, Limited, London, W.12, member company of the George Cohen 600 Group, Limited, which handles all UK sales of Jones Cranes. Entries will be accepted from professional as well as amateur photographers. Closing date is December 31, 1960.

STEEL PRODUCTION in the US this week is estimated by the American Iron and Steel Institute at 1,775,000 tons, as compared with 1,726,000 tons last week and 2,604,000 tons in the corresponding week of last year.

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(For example 12,000 lbs. per sq. inch at 24 hours and 16,000 lbs. per sq. inch at 7 days)

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AP91

This week's estimated output in terms of January 1 capacity of 148,570,970 net tons, is 62.3 per cent., compared with last week's 60.6 per cent.

FIRST-EVER private enterprise exhibition to be held in Moscow is to be opened at the Moscow Polytechnic by Sir Patrick Reilly, British Ambassador in Russia, on June 18. The exhibition has been organized by the Scientific Instrument Manufacturers' Association of Great Britain and over 650 scientific instruments, valued at £250,000, are being shown by the 40 exhibitors.

FIRST 15,600 tons of iron ore of the total 480,000 tons contracted has been shipped to Ferrostal of Essen, western Germany, from the Dominican Republic. The Dominican mining company is to increase output following the German order. At present 1,000 tons are being extracted daily from the Hatillo mine, and deposits at Mogote and Laguna will provide a further 900 tons daily.

BICENTENARY of Spear & Jackson, Limited, Sheffield, manufacturers of saws, etc., was celebrated last Friday. The company, which claims to be the oldest saw-making concern in the world, entertained its 1,250 employees and their families to lunch. In his speech, the chairman, Mr. S. M. Bartholomé, outlined the firm's growth from a two-man business in 1760 to the present day and its future plans.

POYNTING LECTURE for 1959-60 will be delivered at Birmingham University by Prof. P. M. S. Blackett, FRS, on the subject—"Rock Magnetism and Continental Drift." The University has received £31,200 from the Department of Scientific and Industrial Research for research into the dynamics of metal cutting and the dynamic design of machine tools under the direction of Prof. S. A. Tobias.

TWO STEELWORKERS escaped after being trapped by 5 tons of wet crushed iron ore which collapsed as they were cleaning out a hopper at John Lysaght's Scunthorpe Works, Limited, Scunthorpe, on Saturday. Mr. Geoffrey Lassey, only 5 ft. 4 in. tall, was buried completely. His workmate, Mr. Norman Drayton, two steps higher on a metal ladder, was able to scoop the sinter clear of Mr. Lassey's head so that he could breathe.

YUGOSLAV STEEL PRODUCTION is to be increased during the current year by 9 per cent. on last year's figure to an estimated 1,404,000 metric tons. The output of rolled goods is to be increased to 975,000 tons and that of drawn goods to 90,000 (75,000) tons. Work is to begin this year on the reconstruction and modernization of rolling mills at Store, Zenica, and Jesenice and by 1963 the national rolling mill capacity will have been increased by 20 per cent.

NEW COMPANY, for plant design and engineering and construction for the chemical and man-made fibres industries, has been formed by Vickers, Limited, London, S.W.1, and the German industrialist, Herr Hans J. Zimmer, of Frankfurt on Main. Vickers and Herr Zimmer will hold equal shares in the new firm, Hans J. Zimmer Aktiengesellschaft Fuer Industrieanlagenbau. They will also jointly control High Polymer and Petrochemical Engineering, Limited, London.

Mr. MOHAMMAD SHOAIB, the Finance Minister of Pakistan, has discussed with Mr. D. Heathcoat Amory, Chancellor of the Exchequer, and Treasury officials, the feasibility of placing substantial orders for textile machinery in this country. It is understood that Pakistan intends to purchase up to £8,000,000 worth of textile machinery and would prefer the bulk of it to come from this country. Mr. Shoaib is anxious to arrange long-term credit facilities to finance prospective orders, but if such facilities are not available here, West Germany is likely to be approached.

Ore Chartering

MANY of the long distance trades are quieter and some recession in the enquiry is noted with charterers seeking to obtain reductions against last rates paid. There has been no particular activity in the Mediterranean trades, with Toulon/Newport bauxite fixing first half of June at 22s. 6d. for 10,000 tons and a 12,000 tonner for second half of June at 22s. 3d. on f.i.o. terms, and ore from La Goulette to Calais at 27s. for 4,200 tons, June shipment, f.o.b. basis. Burnt ore reports Malaga-Barcelona range to Rotterdam for 9,500 tons June at 23s. 9d. steamer discharging.

Manganese has been fixed from Takoradi to Sauda for second half June at 41s. 6d. f.i.o. and trimmed for 9,500 tons and there has been some activity from the South African region, Durban to Genoa-Bagnoli-Piombino fixing 7,800 tons manganese for second half June at 51s. 10d. f.i.o. and 9,500 tons of ilmenite from Durban to Spezia at 55s. f.i.o., also June. There are also enquiries for tonnage to load bauxite from Takoradi to East Coast UK, but the handy sizes are scarce. Lulea/Gdynia or Gdansk paid Skr. 9.00 f.i.o. for 6,000 tons June and also arranged 13,500 for two trips to Poland at Skr. 8.50 with interest maintained. Here again there appears to be a shortage of the handy sizes to load ore from the Swedish Baltic.

Pyrites reports 9,800 tons from Quebec to Rotterdam for second half June at 31s. and handy tonnage has been fixed from Huelva to Terneuzen 3,700 tons for June at 28s. Huelva/Drogheda arranged a part-cargo of about 1,000 tons for June at 39s. Vassiliko Bay/Rotterdam reports 9,000 tons for end June/July at 26s.

In the phosphate section Casablanca/Immingham paid 27s. 6d. for 11,000 tons June, and Casablanca/Holland is steady at 21s. 6d. for a 19,000 tonner June 5/25. The demand from Casablanca to the UK is only moderate, but on the other hand there is still quite an interest for tonnage to load for China with 56s. 6d. accepted for 11,000 tons to South China for June 1/15 and 58s. 6d. to full range discharge.

More Iron Ore Through South Wales Ports

COMPARED with the similar period last year, traffic through the South Wales ports dropped by about 188,000 tons to 1,120,356 tons in the four weeks ended May 22. Imports of iron ore improved by 87,000 tons and iron and steel goods by 9,000 tons, but other ores dropped by some 16,000 tons.

Coal, coke, and patent fuel leaving the ports dropped by 63,000 tons, and petroleum by 126,000 tons, but tinplate exports were up by 3,000 tons and vehicles and vehicle parts by 5,000 tons.

Total traffic through the seven ports so far this year (with comparable 1959 figures in parentheses) was as follows:—Newport, 884,416 (858,938) tons; Cardiff, 863,728 (814,349) tons; Barry, 497,562 (528,535) tons; Port Talbot, 1,296,198 (1,010,082) tons; Swansea, 2,992,482 (2,844,916) tons; Penarth, 148,577 (188,213) tons; Lydney, 12,766 (10,899) tons.

BRITISH OXYGEN COMPANY, LIMITED, London, S.W.1, has bought Chartridge Lodge, near Chesham (Bucks), for use as a management training college.